

**Promotion of Students' Knowledge and Utilization of the Billings  
Ovulation Method of Natural Fertility Management: An  
Experimental Study**

**By  
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(Clinical Psychology) in the School of Applied Human Sciences, University of KwaZulu-Natal,  
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## **DECLARATION**

I, Cardwick Ruhukwa, declare that:

- a) The research reported in this dissertation, except where stated otherwise is my original work
- b) This dissertation has not been submitted for any degree or examination at any other university
- c) This dissertation does not entail other people's work unless specifically attributed as such, in which case their words have been rephrased and referenced. However, where their exact words have been used, their writings has been placed in quotation marks and referenced as well.

Signed: \_\_\_\_\_

Date: \_\_\_\_\_

We, Mrs Nontobeko Buthelezi and Professor Augustine Nwoye, confirm that the work reported in this dissertation was carried out by Cardwick Ruhukwa under our supervision

Signed: \_\_\_\_\_

Date: \_\_\_\_\_

Signed: \_\_\_\_\_ Date: \_\_\_\_\_

## **DEDICATION**

This dissertation is dedicated to:

My family for the love and support throughout the project

My daughter Nyasha and son Trey, who never stopped believing in me

## **ACKNOWLEDGEMENTS**

I would like to thank my supervisors Professor A Nwoye and Ms. N Buthelezi for the continued support and advice during the study. Your expertise and knowledge is greatly appreciated. I would also like to thank all the students from the University of KwaZulu-Natal who participated in the study. Their contribution to the study is highly appreciated. Last but not least, I would also like to thank my family and friends especially my parents, Chioneso, Nyasha and Trey for your love and support during my studies. I would not have made it without you.

## **ABSTRACT**

This study investigated two teaching methods of enhancing the knowledge and use of the Billings' Ovulation Method (BOM) at the University of KwaZulu-Natal. A sample of 60 male and female post-graduate students was used in a quasi-experimental post-test only control group design. Two experimental groups were evaluated based on a test that was written after exposure to either direct teaching or self-directed learning. The Statistical Package for Social Sciences (SPSS) was used to analyse the data. One-way ANOVA was used to compare the performances of the different groups. For triangulation purposes, the Friedman tests and the Wilcoxon signed ranks tests were also used to analyse the data.

The results indicated that when teaching, BOM as a lecture method produces a higher performance as compared to assigning homework. Participants that engaged in self-directed learning perform better in comparison with those that were not exposed to any teaching method. It was concluded that the results of the study concur with the findings of existing literature that for people to adopt the use of BOM, they require active teaching on an ongoing basis until they are competent to continue independently. Furthermore, the results of the current study reveal that assigning homework can be used for those people who are not able to attend classes due to time factors.

Based on these findings, a number of recommendations were made on how to improve policy and practice people's use of the BOM. These included a strong need for the adoption and use of the BOM in South Africa, a call for stakeholders in the health sector and government can contribute to the enhancement of the knowledge and use of BOM. The Department of Health and maternity clinics can take on the initiative of encouraging the use of BOM and providing many fertility management options to adults in Africa to improve contraception and reduction of sexually transmitted diseases in South Africa.

## TABLE OF CONTENTS

Promotion of Students' Knowledge and Utilization of the Billings Ovulation Method of Natural Fertility Management: An Experimental Study .....	
DECLARATION .....	i
DEDICATION .....	ii
ACKNOWLEDGEMENTS .....	iii
ABSTRACT.....	iv
TABLE OF CONTENTS.....	v
LIST OF TABLES .....	ix
CHAPTER ONE .....	1
INTRODUCTION .....	1
1.1. Background of the Study .....	1
1.2. Statement of the Problem.....	3
1.3. Purpose of the Study .....	3
1.4. Objectives of the Study.....	3
1.5. Research questions.....	3
1.6. Significance of the Study .....	4
1.7. Assumptions of the Study .....	4
1.8. Scope and Delimitations of the Study .....	4
1.9. Operational Definition of Terms.....	5
1.10. Summary, and Overview of the Study .....	5
CHAPTER TWO .....	7
REVIEW OF RELATED LITERATURE .....	7
2.1. Introduction.....	7
2.2. History of the Billings Ovulation Method .....	7
2.3. Key principles and terms of BOM .....	10
2.4. Existing teaching methods for BOM .....	11
2.5. Adult Learning .....	13

2.5.1.	Principles of adult learning .....	14
2.5.2.	Learning theories that inform the study .....	16
2.6.	Review of (Foreign) Empirical Studies .....	18
2.7.	Review of (Local) Empirical Studies.....	20
2.8.	Summary and Synthesis of the review .....	23
2.9.	Research/Operational Hypotheses .....	23
2.10.	Conceptual Framework of the Study .....	24
2.10.1.	Research Paradigm.....	24
2.11.	Summary .....	27
CHAPTER THREE .....		28
METHODOLOGY .....		28
3.1.	Introduction.....	28
3.2.	Design of the Study.....	28
3.2.1.	The type of study .....	28
3.3.	Location of the Study.....	29
3.4.	Study Population.....	29
3.4.1.	Inclusion and Exclusion Criteria.....	30
3.5.	Sampling Techniques and Sample Size .....	30
3.6.	Research Instruments .....	30
3.6.1.	Evaluation materials.....	31
3.6.2.	Validity and Reliability.....	32
3.7.	Data Analysis .....	33
3.7.1.	Triangulation.....	35
3.8.	Ethical Considerations .....	36
3.8.1.	Confidentiality and anonymity.....	36
3.8.2.	Favorable risk ratio .....	36
3.8.3.	Fair selection of participants .....	36

3.8.4.	Independent ethical review .....	36
3.8.5.	Storage and dissemination of results.....	37
3.9.	Summary.....	37
CHAPTER FOUR.....		38
RESULTS OF THE STUDY .....		38
4.1.	Introduction.....	38
4.2.	Research Question 1: .....	38
4.2.1.	Frequency distributions of test scores in the achievement test per group.....	38
4.2.2.	Descriptive Analysis of Distribution: One-way between groups ANOVA .....	42
4.2.3.	Best teaching method for teaching BOM as indicated by test results.....	48
4.3.	Research question 2: .....	49
4.3.1.	Interest and Motivation .....	50
4.3.2.	Participation .....	51
4.3.3.	Guided learning and Self-discovery.....	52
4.3.4.	Prior knowledge of BOM.....	52
4.3.5.	Good Learning Environment .....	52
4.3.6.	Learning for Problem-solving.....	53
4.4.	Research question 3: .....	53
4.4.1.	Technicality of BOM .....	54
4.4.2.	Time constraints.....	55
4.4.3.	Nature of modern relationships.....	55
4.4.4.	Task avoidance and resistance .....	56
4.5.	Summary of Findings.....	56
CHAPTER FIVE .....		58
DISCUSSION AND CONCLUSION.....		58
5.1.	Introduction.....	58
5.2.	Discussion of Results, Research Question by Research Question.....	58



5.2.1.	Research Question 1: .....	58
5.2.2.	Research question 2: .....	64
5.2.3.	Research question 3: .....	75
5.3.	Summary of the Study .....	80
5.4.	Conclusions/Implications of the study .....	82
5.5.	Recommendations for Policy and Practice .....	84
5.6.	Limitations of the Study.....	85
5.7.	Recommendations for further Research.....	85
REFERENCES .....		87
APPENDICES .....		91
Appendix: 1. Letter to the University Registrar.....		91
Appendix 2. Advert for the study .....		92
Appendix 3: Information Sheet for Group.....		93
Appendix 5: Group Confidentiality Pledge .....		97
Appendix 6: Achievement test.....		98
Appendix 7: Test Marking Scheme .....		99

## LIST OF TABLES

Table 1: Overview of the Billings Ovulation Method .....	8
Table 2: Frequency distributions (test scores - Control group) .....	39
Table 3: Frequency distributions (test scores - Homework group).....	40
Table 4: Frequency distributions (test scores - Lecture group) .....	41
Table 5: Descriptive Statistics of test scores in the achievement tests per group.....	42
Table 6: Test of Homogeneity of Variances: Performance on achievement test.....	42
Table 7: ANOVA test for significant difference: Group Performance (achievement test) .....	43
Table 8: Multiple Comparisons between the Groups: Fishers LSD .....	43
Table 9: Means Plots for the groups .....	44
Table 10: Mean Ranks .....	46
Table 11: Friedman test: Chi- square.....	46
Table 12: Wilcoxon Signed Ranks Test: Ranks based on performance per group.....	47
Table 13: Wilcoxon signed to test for significant difference.....	48
Table 14: Frequency distributions of factors and processes affecting learning.....	49
Table 15: Factors and processes required for effective adult learning of BOM.....	50
Table 16: Barriers to learning and adoption of BOM .....	54

# **CHAPTER ONE**

## **INTRODUCTION**

### **1.1. Background of the Study**

The ability to have children is one of the most important things in marriage among Africans. In African countries, there has been emphasis placed on the importance of the male child. As such, there are many challenges that are faced by spouses who fail to get children after marriage or who fail to get children with the sex of their preference. There is also a background of challenges faced by couples in using existing contraceptives. The interest in contraception and fertility management has resulted from the many problems that have emerged over the years including the increasing population and problems of sexually transmitted infections especially the Human Immunodeficiency Virus (HIV) and unplanned pregnancies (Van der Riet, 2009). In South Africa, HIV prevalence amongst youths aged 15–24 is higher than in other age groups, and female youths has a higher rate (16.9%) than male youths (4.4%) (Hoque, 2011). It is against this background that the importance of the Billings Ovulation Method (BOM) was recognised and the need for people to know about it came to the fore. This study examines two teaching methods of enhancing the knowledge and use of the BOM. There is an increasing body of knowledge around the teaching of BOM around the world (Heartley, 2015), however, literature on the teaching of BOM in South Africa is limited.

According to Billings & Westmore (1994), the BOM is an internationally recognized fertility management practice that has been proven to be highly effective in China and Nigeria. In recognition of this, the World Health Organization (WHO) has identified it as one of the most appropriate fertility management methods that need to be brought to the attention of the public (World Health Organisation, 2009). Despite the noted effectiveness of the method, the disappointing revelation from Nondabula (2013) study is that the university students in her sample showed little or no knowledge and use of BOM. The motivation for the present study is influenced by the gap identified by Nondabula's (2013) study namely, the need to explore the appropriate teaching method that can promote students' knowledge and interest in the utilization of BOM. This dissertation aims to contribute to the existing theoretical and empirical literature on BOM by

introducing BOM to the South African context. Also, this study aims to contribute to the development of literature on BOM by examining existing teaching methods of BOM.

This study is driven by the fact that in Africa most relationships especially marriages are strained when there are challenges of childbearing. According to Barnett & Rivers (2009) many couples face challenges when they do not get a child of their desired sex especially given societies placed importance in having male children. Many African families place emphasis on male children so as to ensure the continuation of the family name, lower status of girl child and practices of dowry (Barnett & Rivers, 2009). In addition, male preference has also resulted from the lower status of parents of brides, lifelong responsibility even after marriage and fear of sexual exploitation and abuse. As a result, many societies have witnessed disdain upon the arrival of a girl child. Among most African communities in all child births, what delights most is the sight of a male child (Barnett & Rivers, 2009). As such many marriages have collapsed as a result of failure to have a male child and cases of cheating have also risen as husbands look elsewhere for male children. Given the above, the teaching of BOM has been considered a solution as it allows couples to pre-determine the sex of their babies through the timing of sexual intercourse.

In addition to the above view, the teaching of BOM is also motivated by studies such as those conducted by Van der Riet (2009) and Phyfer (2012) which have shown that there are a number of challenges that people especially women face when using artificial contraceptives. Among these challenges is the stigma that is associated with their use, including the inconsistency of stocking or buying condoms and pills to maintain contraception (Karim & Karim, 2010). Similarly, the studies by Phyfer (2012) and Nondabula (2013) showed that students at the University of KwaZulu-Natal experience similar problems in using different methods of contraception. For example, according to the results of Nondabula (2013), the participants argued that some methods are not very reliable and those which are, often come with many negative side effects. In the study, adherence to oral contraception was also noted to be a great challenge as participants reported that they often forget to take the pills (Phyfer, 2012). In addition, some participants in her study reported having experienced side effects of pills such as weight gain (Phyfer, 2012). These indications illustrate the need for drawing students' attention to other approaches to fertility regulation, such as the BOM, which has been noted for its reliability and no side effects.

## **1.2. Statement of the Problem**

There are a number of methods of family planning that exist that are highly effective but are not well known and utilised in South Africa (Van der Riet, 2009). BOM is one such method that could be of great benefit to university students given their desire to avoid pregnancy as well as a solution to the challenges they are facing when using existing methods. The current critical challenge is how to enhance people's knowledge and utilization of such a method. Unless, a study like the present one is conducted to explore the best way of improving students' ability to make use of such a device, its importance, and practical value in people's lives will go unexploited. By exploring the teaching of BOM, there is a possible window of understanding the best way to teach BOM in the South African context. In addition, such a study provides a guideline of the factors to consider introducing BOM successfully in South Africa.

## **1.3. Purpose of the Study**

The study aimed to investigate the approach or teaching method(s) that can better enhance students' knowledge and engender a higher retention rate among the students after they had been exposed to the BOM. The study also investigated the learning process that would facilitate our understanding of the factors to consider when teaching adults how to use BOM in the South African context especially among university students.

## **1.4. Objectives of the Study**

Among the specific objectives of the study were to;

- 1.4.1. Identify which of the two methods (the Lecture Approach or the Assignment Method) would give more significant results when teaching the use of BOM to adult learners
- 1.4.2. Determine the factors that are required for effective adult learning of BOM.
- 1.4.3. Explore the barriers to take into account for the effective teaching of BOM.

## **1.5. Research questions**

- 1.5.1. Which of the following two methods (the Lecture Approach or the Assignment Method) would give more significant results as a way of teaching the use of BOM to adult learners?

1.5.2. What factors (principles and processes) are required for effective adult learning of BOM?

1.5.3. What are some of the barriers to take into account in the effective teaching of BOM?

## **1.6. Significance of the Study**

The study contributes to the literature on the teaching of BOM in the South African context. This study provided some factors to consider when introducing an intervention targeted at the adult population. The focus on the Billings Ovulation Method provides a solution to the currently existing problems with available contraceptives and other fertility management methods. In this case, this study provides an alternative to family planning that is scientifically proven to be effective and acceptable socially, culturally and religiously. Although not replacing existing methods the introduction of BOM is likely to widen the range of options people can use to manage their fertility.

## **1.7. Assumptions of the Study**

There are a few assumptions that are made in the current study. The core assumption is that there are a number of methods that can be used to teach adults about any topic (MacGregor, 2008). However, other methods are better than others. In this case, this study investigated which method or approach is better to teach adults in the South African context. The other assumption is that there are some ways that can be used to teach adults and the best way to evaluate which method to use can be an experimental method. Other assumptions worth noting are that there are problems in current forms of contraception such as having side effects, and thus there is a need for a method that is effective and has few limitations compared to the existing ones. The last assumption is that students can benefit from the use of BOM in a number of ways including avoiding pregnancy or achieving pregnancy.

## **1.8. Scope and Delimitations of the Study**

The study is centered on understanding the learning of BOM within the South African context, particularly with postgraduate university students. In the study, two learning methods which are direct teaching and homework were evaluated. These were compared to see which one was associated with better performance. In the comparisons, a control group was introduced. The study did not get into the details of the BOM, but the focus was on how best to teach the method.

## **1.9. Operational Definition of Terms**

Learning - *is a change in behaviour that takes place through practice or experience and this change in behaviour must be relatively permanent, and it must last a fairly long time (MacGregor, 2008)*

Andragogy –(Case, 1993) *defines andragogy as the method and practice of teaching adult learners also synonymous with adult education.*

Participation – *According to Van der Riet (2009) participation in research refers to joint consultation in decision making and goal setting.*

Billings Ovulation Method- (BOM) *is a method which women use to monitor their fertility, by identifying when they are fertile and when they are infertile during each ovarian/menstrual cycle. (Billings, 2002)*

Cervical Mucus- *A mucus secreted by glands found in and around the cervix before ovulation takes place (John Billings, 2002)*

Ovulation – *Ovulation is the part of the female menstrual cycle whereby part of the ovary discharges an egg. It is during this process that the egg travels down the fallopian tube where a sperm may meet it and become fertilized (McSweeney, 2011).*

Charting – *refers to the recording of the observations of fertility which couples will use to determine which phase of the cycle (McSweeney, 2011)*

Abstinence – *refers to refraining from sexual intercourse and all contact with the genitals (Billings, 2002).*

Wetness – *Billings (2002) defines wetness as the presence of mucus in the vagina which is a sign of fertility.*

Fertility - *the ability to produce offspring (McSweeney, 2011).*

## **1.10. Summary, and Overview of the Study**

In summary, this section provided the background and motivation of the study. It outlined the objectives and the research questions as well as the scope of the study. Key operational definitions were also provided. This dissertation comprises of 5 chapters. The first chapter is the introduction

which highlights the motivation of the study, its objectives and the questions explored. Chapter 2 provides a discussion of the studies that have been done and the gap identified which formed the motivation of the study. Chapter 3 highlights the methodology used in the study, specifying the research design, the sampling strategies, data collection, data analysis and ethical considerations. Chapter 4 presents the findings of this study including the quantitative and qualitative data. Chapter 5 provides a discussion of the results and how they relate to the existing literature. The chapter also concludes the study by providing the key results and their implications, the limitations, and suggestions for policy and future studies.



## **CHAPTER TWO**

### **REVIEW OF RELATED LITERATURE**

#### **2.1. Introduction**

This chapter presents the core literature around the theme of adult education and the teaching of the Billings Ovulation Method in South Africa and the world. The chapter starts by giving a review of the history and background of the BOM. In the course of the review, some studies that have been done on the use and knowledge of the BOM are discussed. The review looks at learning and how it is conceptualised. In addition, relevant literature on adult education and its key principles were reviewed with reference to some studies that have been done in South Africa and around the world. These studies were chosen for review because they provide a foundation for the study. In this case, a background of adult education (andragogy) is provided and how it has been adopted across regions. In addition, the review discusses a number of approaches that have been used to teach people about BOM to illustrate that a number of ways of teaching it already exist elsewhere in the world including seminar methods, workshops, assignments and couple-teacher sessions which are in line with the principles of adult learning. Lastly, the chapter provides the conceptual framework that has been adopted for the study.

#### **2.2. History of the Billings Ovulation Method**

The following section provides an overview of the Billings Ovulation Method. The section will provide the history of the method, its successes and how it has been used around the world. In addition, the section provides the rationale of why this method has been adopted in this current study.

Table 1 below presents the background of the BOM, its key features and some of its benefits and limitations. The table also presents the existing methods that have been used to teach BOM. This overview is further discussed in detail.

**Table 1: Overview of the Billings Ovulation Method**

<b>Billings Ovulation Method</b>	
<b>Type of family planning</b>	Behavioural-natural
<b>Background</b>	Developed in the 1960s by Dr. John and Evelyn Billing of Australia.  Method later adopted in America, Africa, and Asia
<b>Success rate</b>	96 to 99% when instructions are followed
<b>Usage</b>	Premise - window of fertility in a woman can be identified by analysing the woman's cervical mucus  It identifies patterns of potential fertility and obvious infertility within the cycle  User reminders – accurate teaching and daily charting  Reversibility is immediate  Used to achieve and avoid pregnancy
<b>Benefits</b>	Low cost, no prerequisites for use, no side effects like weight gain, can aid pregnancy achievement. No clinical review required.
<b>Limitations</b>	No protection from sexually transmitted diseases
<b>Existing methods</b>	Teaching classes, tutorials, workshops, homework, conferences

The BOM, which provides the main framework for the present study, was developed in 1960 by Doctor John and Evelyn Billing of Australia (Billings & Westmore, 1994). Billings (2002) notes that the method was developed as a natural family planning method based on the form of fertility awareness used to monitor women's health. The first studies on BOM were conducted in the 1960s in Australia. Since then other studies were done around the world including in Africa, Asia and America. The main position of the BOM is that it is possible to recognize the window of fertility in a woman by analysing the woman's cervical mucus (Davies, 2012). Supporting this observation

Davies (2012) notes that BOM allows women to postpone pregnancy and for this reason gives them control of when to become pregnant. The method is being prescribed even by the Churches because it is natural and reliable and free from unintended harmful side effects as compared to other forms of contraception (Davies, 2012). Billings and Billings (1990) argue that BOM can be successfully used to avoid pregnancy. He noted that it has 0.1 % pregnancy rate meaning that when used properly, only a single person in 100 would become pregnant. BOM has been successfully used in China to reduce population as well as in Nigeria to successfully pre-determine the sex of babies (McSweeny, 2012). In conclusion, the extant literature shows that BOM is an effective method that has been successfully applied in many parts of the world. BOM is a method of natural family planning that enlightens women to identify their individual pattern of natural fertility and infertility. As a natural method of family planning, BOM does not involve the use of pills, injections or any alteration to the reproductive organs. However, it involves learning to identify the natural signals of fertility to become pregnant or avoid pregnancy and to safeguard an individual's reproductive health. The BOM has been scientifically researched and validated by scientists all around the world (Billings & Westmore, 1994). According to Smith and Smith (2014), BOM can be used in all the different circumstances of a woman's reproductive life, irrespective of the length or regularity of her cycle. As a natural method, it has proved to be effective and as such has been used in different continents such as Australia, Asia, Europe and Africa (Billings, 2002).

The BOM has acclaimed world recognition and has been advocated for by many professionals. According to Odeblad (1997), BOM is being prescribed by health professionals and some church leaders because it is natural and reliable and free from unintended harmful side effects as compared to other forms of contraception. There is evidence in research suggesting that BOM is a highly effective method of family planning and can thus be used by people who wish to plan their families and safeguard their health. As a natural method, it is important to understand what natural methods are and how BOM is different from the other natural methods.

In the current study, BOM is identified as an underutilised possible solution to existing challenges with current methods of contraception. Studies such as those conducted by (Karim & Karim, 2010); Van der Riet, 2012; Phyfer, 2012) have shown that there are some challenges that people, especially women, face when using artificial contraceptives. Among these challenges is the stigma that is associated with their use, including the inconsistency of stocking or buying condoms and

pills to maintain contraception (Karim & Karim, 2010). Similarly, studies by Phyfer (2012) and Nondabula (2013) have argued that students at the University of KwaZulu-Natal have experienced problems when using different methods of contraception. In her study, Nondabula (2013) noted that participants described existing contraceptives as unreliable. Those that were reliable were said to come often with side effects such as weight gain. This further suggests that there are problems with existing contraceptive methods. Similarly, Phyfer (2012) also noted that students sometimes forget to take the contraceptive pills. The above suggests that there is a challenge that students are facing when using existing methods and thus there is a need for drawing students' attention to another approach to fertility regulation, the BOM, which has been noted for its reliability and zero side effects.

### **2.3. Key principles and terms of BOM**

The Billings Ovulation Method is a natural form of fertility management that is based on observations of vaginal secretions. Billings et al. (1990) argue that the menstrual cycle days among women vary; however, a woman can see their dryness or wetness by paying attention to how they feel and what they see. These observations are done on the outside and are made between the fingers throughout the day especially when they go to the bathroom (Kearns & Marie, 2010). Observations are made at the level of vulva where the first sensation and appearance of wetness should be considered a day of fertility. Observations are made so that the woman will know what phase of her cycle she is in, and what rules she must follow if she wants to avoid pregnancy. Observations of dryness and wetness constitute the basic principles of understanding fertility in BOM. After observations are done, the next step is charting. According to McSweeney (2011), this process is important because no one can use BOM without a system of charting. Charting is done by making observations of wetness and dryness and whether it is light or felt, or seen. Slippery and wetness are considered to be a sign of high fertility. Charting involves recording what the woman feels and sees. It is argued that failure to keep a chart results in pregnancy and that charts should be kept as long as the couple uses the method. The third important aspect of the method is abstinence. Kearns & Marie (2010) argue that abstinence is very important in the method especially in the days of learning the method.

Another critical component of BOM is learning about ovulation (the peak day). Billings (2002) argued that the key day is the very last day of slippery wetness felt at the vulva. It takes about three

cycles to learn about the key day. Ovulation is recognized by a change in the texture and quality of the cervical mucus, and it signals the beginning of ovulation. When the mucus is observed, it can be a sign of both the beginning of the fertile phase or its ending (Billings, 1990). If oestrogen rises, the mucus becomes progressively more slippery, stretchy, and clear. Peak, which is defined as the last day mucus with fertile characteristics such as slippery, stretchy, or clear appears at the vulva (Billings & Westmore, 1994). The largest amount of mucus and the greatest elasticity (stretchiness) is met the day before the peak. During the fertile times abstinence is critical. Abstinence is thus one of the rules that must be followed (Billings & Westmore, 1994). Other rules include; avoiding sex during the change from dry to wet periods, having sex at night and avoiding sex in days of menstruation. In summary, the basic philosophy that underpins natural fertility management is identifying ovulation by charting of the cervical mucus. In addition, there are some rules that have to be observed for the method to be effective.

#### **2.4. Existing teaching methods for BOM**

This section reviews the various teaching methods that have been used around the world to enhance the knowledge and use of BOM. The section also provides a rationale for why direct teaching and self-directed learning were chosen to be the methods of investigation. According to Billings (2002) women become fertile only for a few days during their cycle. However, most women lack the awareness of the natural signs which indicate that they are fertile or not. The method is used to teach partners to recognize their joint fertility and thus gives them the knowledge they need to make decisions about avoiding or achieving pregnancy (Otwombe, Petzold, Martinson & Chirwa, 2014). It is important for couples to learn about the methods and support each other in their use. There is also evidence that fertility education can produce better results as compared to other intervention strategies. For instance, the WHO Multi-Centre Trial of teaching females how to use BOM showed that after the first teaching phase over 90 % of the women were able to accurately identify the fertile mucus. After three more teaching phases, the figure rose to above 95% (World Health Organisation, 2009). A number of programs have been developed to enhance the use of BOM around the world. At a global level, organisations and individuals have spread the use of the BOM method through conferences, workshops, websites and teaching programs, and it is pivotal to examine the most effective teaching method because its success depends on proper training.

BOM is argued to be a distinct method that should be used alone and the success in its application depends on upon attention to the instruction provided by competent and enlightened teachers (Laing, 1984; Clubb, Pyper & Knigh, 1992). A number of people have already been trained as teachers. Those who learn this method can also pass to the knowledge for instance mothers can teach their daughters. The mother-daughter teaching is very helpful in that teaching happens at home, and the mother can easily help the daughter in understanding her fertility. Teaching is important because the success of BOM depends on understanding, accurate observation, accurate charting mutual motivation and loving cooperation. Other teaching formats include lectures on different aspects of BOM. Some classes on charting fertility patterns and keeping ovulation calendars for contraception are offered by women's health centres, church-affiliated instructors, and Catholic hospitals for little or no cost (McSweeney, 2011). Some teaching programs have been done in collaboration with many organizations such as the provincial family planning commission in Australia (Heartley, 2015).

Homework is another method that can be adopted when teaching BOM. It was chosen to be one of the teaching methods under investigation because it is among the different types of self-directed learning that are currently available for teaching BOM. Regan (2003) notes that to meet the challenges of time constraints among adult learners, self-directed learning (SDL) is essential. In self-directed learning, learners take the initiative in making use of resources rather than simply react to transmissions from other individuals or resources, thus helping learners to learn more and learn better. Regan (2003) adds that the main purpose of education should be to develop the skills of inquiry, and more importantly, to go on acquiring new knowledge easily and skillfully the rest of the individual's life. According to Knowles (1975), SDL in its broadest meaning describes a process in which individuals take the initiative with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying resources for learning, choosing and implementing learning strategies and evaluating learning outcomes. Based on the fact that most postgraduate students had busy schedules one of the experimental groups was assigned to self-directed learning.

In line with the above argument, individuals who learn to use BOM through self-directed exercises have made use of Internet-based interventions which have also been argued by Heartley (2015) to be associated with an increase in sexual health knowledge. According to Simon and Daneback (2013), many people have taken an interest in sex information online and are interested in many

topics including sexually transmitted infections and pregnancy. In conclusion, self-directed learning is one of the options that individuals can use if they want to learn more about BOM and given some of the challenges that adult learners face including time constraints. Due to time constraints that many postgraduate students face, this method has been chosen as the second experimental method.

Workshops are also other ways that encourage participation and collaboration which have been used to teach BOM. In Australia workshops held by accredited teachers help women and men to use BOM as well as to train them on how to become teachers (Billings, 2002). In these workshops, they use a curriculum that was developed by the Ovulation Method Research and Reference Centre of Australia. Heartley (2015) reports that conferences have also been done globally to discuss the research and programs that have been done. WOOMB International Ltd together with Natural Fertility Awareness Services of Malaysia has been involved in conducting many conferences, for example, the diamond jubilee conference (Hearty, 2015). In summary, there have been intense efforts to spread the use of BOM worldwide. Most of them, however, require much capital and as such this study enhanced the use of this method on a small scale as part of a larger project.

In summary, this section looked at the history of BOM and its origins from trials and experiments around the world. It was observed that as a method it is highly effective and can be used for both birth control and pre-selection of babies. The review also suggested that BOM has acclaimed world recognition and being adopted in any areas such as in China, Australia, Nigeria and the United States of America. In addition, this fertility method has been encouraged by many health professionals including gynaecologists who argue that it has advantages over existing methods such as the absence of side effects (Billings, 2002). Churches have also taken an interest in BOM as it a natural form of family planning thus BOM is in line with many religious doctrines. BOM can be a solution to the many problems that South African couples face such as failure to conceive or problems of unplanned pregnancy among others. It was also noted that are number of methods can be used to teach BOM and as such this study took an interest in understanding adult learning as it informs how best to teach BOM in South Africa.

## **2.5. Adult Learning**

Adult learning is at the core of understanding how to teach adults on the use of BOM. In this case, an understanding of the concept is of paramount importance. Learning is one of the most important

concepts in psychology. Learning is a key process in human behaviour and can be defined as a process that results in relatively permanent or long-term change in thinking and behaviour and occurs as a result of practise and experience (Aitchison, 2003). The current study investigates issues around andragogy (adult learning) in the South African context. Enhancing the use of BOM among adult university students is a form of adult learning. Learning is often related to the acquisition of knowledge and is a lifelong process, however, it may differ depending on age and stages of development. Learning goes beyond the traditional schooling and basic learning (Fenwick et al., 2006). This study focuses on adult learning which can be defined as sustained, systematic and self-educating activities that are done for the purpose of gaining new forms of knowledge, skills, attitudes or values. According to Fenwick et al. (2006) the philosophy behind adult learning is that adults can and want to learn and as such are willing to take responsibility for that learning. In addition, adult learning is a response to their needs which may be related to available opportunities.

In recent years, learning theories have taken an interest in considering cultural traits and characteristics (Ellis & Richardson 2012). This has been due to the noted limitations in western ideals and educational traditions which have prompted scholars to focus on new approaches to higher education and adult education (Weiten, 2010). Case (2003) has argued that adult learning in Africa is associated with the acquisition of knowledge, skills and attitudes which are required for social, economic and political participation and transformation. As such it can be argued to be in line with social learning theories such as that proposed by Lev Vygotsky and Bandura which put emphasis on the context of learning (Bandura, 1972; Vygotsky, 1978). For Vygotsky learning should be done in a familiar environment that is not threatening and that encourages participation. These theories are further discussed in the following sections.

### **2.5.1. Principles of adult learning.**

The study is based on understanding how best to teach adults to use natural fertility management methods. At the core of the study is an attempt to see how best to teach adults in the South African context. When assessing adult learning, it is important to consider the following principles of andragogy (Aitchison, 2003; Fenwick et al., 2006; Ellis & Richardson, 2012). According to Fenwick et al. (2006) adults learn effectively when they



have the inner motivation to acquire new skills or develop existing ones. Also, adults learn when they feel there is a need to learn. Adults are argued to be practical in their learning as their knowledge requirement serves a purpose. As such educators seeking to teach adults should be more practical and direct. This largely helps in identifying people who are likely to take interest in adopting BOM. The participants would have to be people with an interest of knowing natural ways of managing their fertility and in this case adult people who are sexually active and in committed relationships.

Another key principle of adult learning is participation. According to Aitchison (2003) involving adults in the learning process through participation has positive learning outcomes. Participation also allows them to use the learned skills immediately so that they can see the relevance of learning. Furthermore, Aitchison (2003) argues that African communities are very closely knit in terms of activities and lifestyles. Therefore adult learners in an African context would find higher rates of success when they employ a participatory approach (Aitchison, 2003). Participation is done through open and honest dialogue about the fears, motivations, beliefs and ambitions of the community and is done with less social strain concerning divergent individual behaviour.

In addition to the above, adult learning is mainly problem-based and is done to either improve existing skills or to develop new ones (Ellis & Richardson, 2012). In South Africa, most adults attend adult basic education (ABE) classes to learn the skills needed to earn high school equivalency certificates or to achieve other goals related to the job, family, or further education (Gail & Jane, 2001). For instance, they get a diploma to get a job. In this case, one has to identify the need and then help them work towards achieving that need. In conclusion, adults learn effectively when they have a strong inner motivation to develop a new skill or acquire a particular type of knowledge.

The other principle is that adults need constant guidance from competent peers and educators. Ellis and Richardson (2012) note that adult learners learn differently from children, for instance, they prefer options rather than instructions. Cretchley and Castle (2001) also support this view by arguing that adults do not want to be told what to do but want to choose options based on their individual needs. In comparison to children, adults bring in prior knowledge to the learning process and have more knowledge based on their life experiences.

Another important factor is that the environment in which learning takes place is also important. Ellis and Richardson (2012) argue that adults learn best in informal settings which are more relaxed and inviting.

Time constraints have been noted to be a challenge for many adult learners. Aitchison (2003) argues that many adults have busy schedules and have to take care of their families and work. Cretchley & Castle (2001) affirm that adults often have to manage demanding jobs, family responsibilities, and community commitments as such adult learning may not happen easily as in conventional education. In most cases, the lessons may be done after hours or during the weekend. Although they may be highly motivated to learn, the pressures of life often limit the time many adults can invest in learning. Therefore, in many cases, learning must be available when it is convenient for the learner and delivered in “manageable chunks.” These may come in the form of modularized e-Learning programs, podcasts, or webcasts or may be strategically delivered through informal training initiatives. Adults may thus benefit from self-studies and homework so that they can learn at their own time at their own pace.

### **2.5.2. Learning theories that inform the study.**

It is essential to have an understanding of existing learning theories to understand how participants can learn about BOM. There are some learning theories and conceptual frameworks that describe how information is obtained, processed, and retained during learning. According to Kelly (2006) learning theories acknowledge that there are cognitive, emotional, and environmental influences to learning. In addition, prior experience also plays a part in how knowledge and understanding are acquired or changed. Learning theories have been developed over time, and they try to understand learning in different ways. Learning theories can be classified into behavioural theories, cognitive theories, social learning and ecological theories (Kelly, 2006). Since the main objective of the project is to teach and enhance adult students’ knowledge and use of BOM, it is imperative to identify theories that help understand adult learning.

Case (1993) argues that there are a number of learning theories, models and frameworks that address how people learn. A number of paradigms have been used to understand learning, and these include Behaviourism, Humanism, Cognitivism, and Constructivism among others

(Case, 1993). Behaviourism assumes that learners are passive and respond to environmental stimuli. In this case behaviour is shaped by either positive or negative reinforcement. Due to some noted differences in these approaches, a number of theories have also emerged including operant and classical conditioning, social learning, attribution theory, situated cognition and emotional intelligence just to mention a few. Humanism views learning as a personal act to fulfil one's potential, and it focuses on human dignity, potential, and freedom. The assumption is that people construct meaning, and they act with intention and values. It thus focuses on the study of the self, motivation, and interest. Cognitivism views a learner as an information processor just like a computer. It focuses on inner mental activities such as thinking, memory, problem-solving and knowledge. In this case, knowledge is seen as schemas of symbolic mental constructions.

Constructivism argues that learning is an active and constructive process. The learners are seen as constructors who create their subjective representations of objective reality. The assumption of this approach is that knowledge is constructed and not acquired and results from experience. In addition, learners are argued to have past experiences and cultural factors that they bring to the learning situation. Another common social theory in the social sciences is the socio-cultural approach. Vygotsky proposed a theory that learning happens through practical in a social environment (Wertsch, 1985). This theory is the one that has been adopted in the study and is discussed in detail in the section titled Conceptual Framework.

Another theory that helps us understand learning is Bronfenbrenner's Ecological Systems Theory. This is a developmental theory which provides a systemic understanding of learning and as such is ideal to use when understanding barriers to learning. Harris (2012) notes that the ecological systems theory identifies different layers where such barriers exist, and these include the microsystem, mesosystem, exosystem and chrono-system (Shaffer & Kipp, 2013). Harris (2012) adds that the various systems operate around the individual and affect the learning process. The microsystem is the immediate environment or surrounding of an individual. Shaffer and Kipp (2013) argue that a barrier to learning within this layer can occur between the teacher and learner. The mesosystem incorporates the various interactions that occur between the microsystems, such as the interaction between a home and teaching environment (Shaffer & Kipp, 2013). This layer may present a barrier to learning if learners

do not have for example, transport to get to school. The exosystem is the social system and may have an indirect effect on learners including health policies (Shaffer & Kipp, 2013). The macrosystem is the last layer which comprises of the cultural system in which learning occurs. It includes some societal barriers such as issues of poverty or low socioeconomic status (Shaffer & Kipp, 2013). This theory is relevant to the study as it helps identify the possible barrier to the teaching of BOM in South Africa. The theory captures the dynamics of the learning process especially barriers to learning and thus enables the location of some barriers to learning that can be anticipated.

In conclusion, this section looked at the different principles of adult learning which include participation, inner motivation and constant guidance. In addition, prior experiences as well as providing a friendly environment are some of the principles of adult learning. It can be argued that although a number of principles of adult learning exist, not all are suitable for every context, and it becomes necessary to identify those that are associated with the teaching of BOM. The section also looked at the different learning theories that have informed practices in both education and psychology. These theories included social learning and the ecological systems theory.

## **2.6. Review of (Foreign) Empirical Studies**

Adult learning has proclaimed recognition in many parts of the world. The following section provides an overview of adult learning in the world. In addition, the section also argues that efforts to teach BOM can be seen as forms of adult learning especially as they are not done in formal settings as tradition education. The study examined the learning process and how adults actually learn. Adult learning is not limited to basic education and involves a number of cognitive processes. It is thus important to look at other important concepts such as higher order learning. High order learning is a concept in learning which assumes that some types of learning require more cognitive processing than others (Cretchley & Castle, 2001). The teaching of BOM is regarded as technical and complex as it involves the learning of complex judgmental skills such as critical thinking and problem solving. As such learning how to use the method requires accurate observation and timing so as to identify fertile periods. The method is argued to be effective if its instructions are followed carefully. In this study, the ability of the participants to provide answers to the questions around BOM will also be an indication of their ability to use higher order learning.

Indigenous learning is one of the dominant ways in which learning occurs in Africa. According to Regan (2003), African indigenous education or learning is a process of passing on inherited knowledge, skills and cultural traditions, norms and values among the ethnic or tribal members from one generation to another. This suggests that before the establishment of formal schools in Africa, knowledge was passed from generations to generations. In Africa, indigenous education is a lifelong process of learning whereby a person progresses through predetermined stages of life (Cretchley & Castle, 2001). This means that African indigenous education is continuous throughout lifetime from childhood to old-age. Knowledge of natural family planning can be argued to be among other forms of knowledge that are shared between generations. Parents have always passed down their knowledge from generation to generation around the importance of abstinence, around methods of ensuring pregnancy (Fenwick et al., 2006). BOM is also another method that can and has been passed down to children by mothers and aunts who have learnt how to use the method.

Some African countries have enjoyed successes in implementing adult learning programs. For example, Uganda enrolled over 2 million participants in the functional adult literacy program between 1990 and 2007. According to Ellis and Richardson (2012), Namibia also placed emphasis on adult education after gaining independence in 1990. Many programs have been done to improve adult education. For instance, the Namibian Ministry of Education commissioned the development of national standards in 2010 to express competency requirements for adult educators (Ellis & Richardson, 2012). They conducted a thirty focus group study which indicated the work for adult educators is more complex and demanding than had previously been appreciated. The following are some of the competencies for educators that were identified in the focus groups; knowledge as an adult educator, ability to practise and establish relationships as well as working within the boundaries of ethics and professionalism (Ellis & Richardson, 2012). The study also concluded that a participatory process is ideal for adult learning. The Namibian case provides a unique perspective on understanding adult education and not only focus on the learning process or characteristics of adult learners. However, it sheds more light on the role of adult educators and the qualities they must have to teach adult learners.

A study on adult learning conducted in America examined the processes of knowledge acquisition and transmission among two “communities of practice” in Humboldt Park a community located in

Chicago (Johnson, Stribling, Almburg, & Vitale, 2015). Johnson et al. (2015) examined the ways in which two adult women engaged in learning processes and enacted cultural practices within their workplace settings, a community café, and a local health initiative. A primary objective of this broader ethnographic study was to provide insight into the various ways that community residents obtained and utilized knowledge, skills, and practices, as well as the larger role that these spaces and sites play in the life of the community. The study concluded that adult learning involves processes of knowledge and skill acquisition and development within non-formal educational settings such as a particular workplace and community settings. In such places, the concept of intent participation certainly is in line with adult learning. In the study observation and participation in activities with the goal of learning and acquiring skills and knowledge were akin to their notion of intent community participation.

Contraception and family planning has been one of the topics trendings in adult learning around the world. McSweeney (2012) asserts that with the significant decline in infant mortality, an increasing need for child spacing became evident. In the second half of the 20th century many contraceptives were discovered and extensively promoted and as a result, they assumed a high profile. Many adults have taken an interest in learning about contraceptives including cost-free natural methods which are preferred by many couples for reasons of economy, ecology, religion, as well as a desire to maintain control of one's fertility (Billing, 2002).

## **2.7. Review of (Local) Empirical Studies**

This section provides a review of studies on adult learning in South Africa. The section argues that adult learning in South Africa is still growing, and more work still needs to be done. In South Africa, the post-apartheid idea of opening access to public higher education for growing numbers of non-traditional students is not yet a reality. Also, literature on adult education in South Africa can be argued to be still in its infancy. According to MacGregor (2008) the dreams of attracting adult learners who missed opportunities under apartheid have remained aspirations. Although a reasonable number of adults have been enrolled in both public and private institutions for short courses, institutions are still battling to accommodate the increasing number of school leavers. Although there are noted challenges to adult learning in South Africa, adult learning has been growing (Johnson et al., 2015). The notable adult learning programs are adult basic education

programs which are argued to be the largest programme of its kind in the world. The distance-learning University of South Africa has trained more than 80,000 adult basic education practitioners from 1995 onwards, and it is hoped that graduates of the program would participate in a huge literacy campaign (MacGregor, 2008).

In South Africa adult education also came to the fore in the 1990s when policy makers were responding to the economic and political imperative to employ more skilled and flexible workforce (Ellis and Richardson, 2012). South African adult education is grounded in the humanistic approach to adult education which places emphasis on the person as a holistic being (Cretchley & Castle, 2001). It thus allows for considerable differences which characterize mature adult learners. McGregor (2008) has pointed out that in South Africa most of the models have been developed outside the country and have been adopted in the South African context. He argues that the models adopted in the 1990s were adopted from overseas models of teaching and training. The question that often arises is that can those approaches be adopted in South Africa given the differences in culture and practices of people of Africa and those from Europe and America. The study by (Cretchley & Castle, 2001) concluded that problems which arise in introducing adult education have more to do with features of the context and the processes of design and implementation, than with inherent defects in the theories underpinning them. In this case, the challenge is not the origins of the models but how they are implemented to suit the needs of the context in which they are being used.

In South Africa, numerous adult programs on contraception have been done. Although some of the programs were done at academic institutions for research purposes, they can be considered to be programs involving adult learners. A study conducted by Phyfer (2012) showed that for university students, pregnancy creates financial burdens, increases demand, pressure and inability to cope especially when unplanned. Her study concluded that there is need to teach female students about ways to manage their fertility. Such a need is important, particularly here in South Africa, if the following observation by the WHO (2009) is taken into account, up to 35 % of females in South Africa fall pregnant before the age of 20. Against such a scenario, it becomes important to find the best way for women, in this case, students from the University of KwaZulu-Natal to learn about BOM. The present study is among other studies and programs that have adults being taught on the use of contraception. Students would benefit from such programs so that they could delay

having children and finish their education and avoid financial burdens. In addition, there are also some medical reasons for avoiding pregnancy for instance if a woman has had a number of caesarean section birth deliveries (C-section).

In line with the above argument, many South African women are unaware of the natural signs that indicate their fertility. If they are educated on the workings of BOM, they would be able to understand the different stages of their fertility, and thus able make decisions about avoiding or achieving pregnancy. Current literature suggests that in South Africa little is known about BOM. According to Nondabula (2013), a few participants in her study were familiar with BOM. The few who knew about BOM did not use as they had limited experience in how it works. Considering problems that people in South Africa face such as unplanned pregnancies and failure to achieve pregnancy, BOM is a good method that can help resolve such problems. With this background, it becomes necessary to conduct this project aimed at increasing the awareness and use of BOM.

Given the rise of problems related to sexual behaviour, some programs have been done to teach adults on the use of contraception. Studies by Van der Riet (2009) in the Amathole basin indicated that given the existence of different methods of fertility management which include condoms, contraceptive pills and withdrawal had not been a solution for the continued problem of HIV and poverty. Van der Riet (2009) identified that there were challenges that were experienced in using these different contraceptive methods. For instance, most of the partners refused to use condoms because they were said to be limiting the pleasures and preferred unprotected sex. Some refused to use them because they were not comfortable and some argued that they were not 100% reliable. Similarly, a study by Phyfer (2012) indicated that contraceptive pills such as the emergency contraceptive pill and family planning pills were argued to have side effects such as weight gain, skin irritation, increased probability of infertility and that they were not easily accessible. Van der Riet (2009) also noted similar challenges with existing contraception. She observed that highly sexually active youths do not take adequate precautions against HIV and AIDS. In addition, the study also concluded that a South African rural context was characterized by a particular set of risky sexual practices. With this in mind, it becomes important to explore other ways in which people in South Africa especially students can engage in sexual activity without the risk of pregnancy. It is thus important to consider BOM as it is one of the recommended and tested methods to avoid pregnancy.



In summary, local studies have indicated many people are facing challenges with existing methods. Despite this they have little knowledge about BOM and teaching the method would be beneficial to them. The local studies have noticed an improvement in adult learning programs and have identified that teaching of contraception has been one of the topics of study. Adult learning programs have stressed the importance of participation and have argued that most successful programs have used participatory approaches.

## **2.8. Summary and Synthesis of the review**

There are a number of ways of teaching BOM to adults that have been developed over time. These methods include direct teaching and self-directed learning. Methods that involve direct teaching include lectures, workshops, tutorials, and conferences. On the other hand, some theories around adult education and these highlight key issues in adult education. In South Africa, literature on adult learning can be argued to be growing as there are equally growing numbers of adult learning programs. However, more work still needs to be done to explore the uniqueness of the African experience.

This chapter focussed on teaching the BOM which is a natural form of fertility management that has been a scientifically proven effective method of managing fertility. It noted that there exists a need for new methods of contraception as there are problems in the current methods. Knowledge on BOM could help people in a number of ways including sex selection of babies, how to achieve or postpone pregnancy. It was also noted that there exist a number of ways in which the knowledge and use of BOM have been spread. It was concluded that there is a need to identify which method best suits teaching adults in South Africa particularly those who are enrolled in tertiary institutions.

## **2.9. Research/Operational Hypotheses**

The assumption of the study was that teaching people about BOM would depend on the teaching method that would improve their awareness and knowledge of BOM. In the study, it was hypothesised that there would be significant differences in performance between the control group and the two experimental groups. The control group was not exposed to any treatment and was used as the baseline in which the other groups were compared. The two experimental groups were either assigned to do homework (learn BOM, on their own) or were actively taught by a teacher in a lecture format. It was expected that the participants who are exposed to the teaching methods

should have a better understanding of the workings of BOM as compare to those in the control group. The other hypothesis was that the participants who are actively taught in the lecture method would perform better than those in the homework group. This is based on literature which suggests that adults learn more through guidance, participation and when learning is done in an interactive environment.

## **2.10. Conceptual Framework of the Study**

This section presented theories that help understand adult learning which informed how participants were taught to use the BOM. The study drew from multiple paradigms including phenomenological perspectives and humanistic approaches. This approach was utilised because the study had an interest in the study of experience such as learning. The approach that informs this study was adopted from a Social-Constructivist paradigm which is Social Learning Theory. Social constructivism maintains that human development is socially situated and knowledge is constructed through interaction with others (Wertsch, 1985). It is a sociological theory of knowledge that applies the general philosophical constructivism into the social. In understanding participants' motivation and interest in using BOM, the study used aspects of the Health Belief Model (HBM).

### **2.10.1. Research Paradigm.**

The current study also draws from multiple contextual paradigms. The research is mainly a humanistic paradigm based on phenomenological perspective. It is phenomenological in nature as it is motivated by lived experiences of people (Blanche, 2006). This study is interested in such experiences such as people's failures and aspirations. Many couples have been faced with challenges such as failing to conceive a child, and those who have had the privilege of having babies may also face the problems of not having children who have their desired sexes (McSweeney, 2011). A closer observation of marriage and maternity in the framework of order, one can observe that there are many challenges that a marriage couple faces when their efforts of having a baby emerge. In this case, marriage is often affected by childlessness or male childlessness. The common problems in marriage can be solved by adopting the BOM.

The social learning theory informs this study. Social learning can be argued to be an important theory that helps in understanding adult learning. Social learning approaches have been proposed by scholars such as Bandura and Vygotsky. According to Bandura Social learning theory integrated behavioral and cognitive theories of learning in order to provide a comprehensive model that could account for the wide range of learning experiences that occur in the real world (Bandura & Walters, 1977). Bandura concluded that learning is not purely behavioural; rather, it is a cognitive process that takes place in a social context (Bandura, 1972). Secondly, learning can occur by observing a behaviour *and* by observing the consequences of the behaviour (vicarious reinforcement) (Bandura & Walters, 1977). Bandura also noted that learning involves observation, extraction of information from those observations, and making decisions about the performance of the behaviour (observational learning or modelling). Thus, learning can occur without an observable change in behaviour. On the other hand, Lev Vygotsky in his socio-cultural theory proposed a theory that learning happens through practical in a social environment (Wertsch, 1985). For Vygotsky, learning was also mediated by signs and symbols such as language. The other idea proposed was that prior knowledge is important for the acquisition of new knowledge, and this is articulated in his notion of the zone of proximal development (Wertsch, 1985). In addition he stresses the importance of scaffolding which is assistance of a novice learner by a competent other and in this study participants were assisted by competent teachers who are familiar with BOM and socio-cultural factors were considered to help achieve the outcomes. It can be concluded that based on the works of Bandura and Vygotsky social factors and their dynamics affect learning and thus social learning theories can be used to enhance the awareness of good sexual health practices.

According to Gagnon and Simon (2005) people use past experiences as cues that guide them in future behaviours. According to Gagnon and Simon (2005), any sex education can provide such points of references for people to explore. In addition, when young people are exposed to information about contraception and sexually transmitted infections they may be more likely to protect themselves when engaging in sexual behaviour. It can be observed that the assumptions of social learning theories are in line with the assumptions of adult learning which indicate the importance of prior knowledge, participation and

guided learning. For Vygotsky, learning was also mediated by signs and symbols such as language. The other idea proposed was that prior knowledge is important for the acquisition of new knowledge, and this is articulated in his notion of the zone of proximal development (Wertsch, 1985). In addition, Vygotsky stresses the importance of scaffolding which is assistance of a novice learner by a competent other and in this study participants were aided by competent teachers who are familiar with BOM and socio-cultural factors were considered to help achieve the outcomes. Vygotsky and Bandura direct attention to important dynamics of learning that were considered in the research.

The second part of the study tried to understand the participant's motivation and willingness to use BOM. In the current study, the Health Belief Model was used to understand that factors that may influence people to change their behavior. The Health Belief Model (HBM) is a psychological model that attempts to explain and predict health behaviours. This is done by focusing on the attitudes and beliefs of individuals (Gagnon & Simon, 2005). The HBM is argued to be one of the most widely used approaches to understanding individual health behaviours in Sub-Saharan Africa. It is used for this study because its components reflect the goals of the study which is to raise awareness and reduce barriers to safer sex and increase perceived benefits of prevention. Gagnon & Simon (2005) argue that HBM was first developed in the 1950s in response to the failure of free screening programs for tuberculosis (TB). Since then, the Health Belief Model has been adapted to explore different health behaviours such as risky sexual behaviours, smoking, drinking and driving, cancer and the transmission of HIV/AIDS. Gagnon and Simon (2005) argue that the HBM model assume that people can take health related actions if they feel that a negative health condition can be avoided. In addition, they can also take action if they see positive outcomes related to taking such action and if they believe that they can successfully do the recommended action.

The HBM identifies four constructs that represent the perceived threat and net benefits. These include: perceived susceptibility, perceived severity, perceived benefits, and perceived barriers. These concepts help account for people's readiness to use BOM if they believe they are at risk of having an unplanned pregnancy and they are aware of the problems associated with it. According to Billings (2002), another concept added cues to

action which activate the readiness and stimulate the individual's overt behaviour. In this case, people's internal desire to use the method under study is harnessed into becoming a practice that they take up and use. One of the important concepts mentioned above is self-efficacy, which looks at the confidence in the ability that one has to perform the action, that is, in this case the ability to use BOM successfully. The theory was initially used to help the health belief model to fit better in relation to the challenges of changing habitual unhealthy behaviours, such as being sedentary, smoking, or overeating. Over time the Health Belief Model has been applied to a range of health behaviours. These include preventative programs such as avoiding pregnancy, health promoting (using safer means) and health-risk such as contraceptive practices. The theory can be used to understand how people can comply with the recommendations of BOM following the advice of the professional.

## **2.11. Summary**

In summary, this chapter discussed the existing literature around adult learning and some principles of andragogy. The chapter also provided a review and background of the BOM. Reasons why it should be adopted were highlighted and these included the noted problems of existing methods such as side effects, availability, and cost among others. The chapter also looked at empirical studies that have been done around adult education in the world and South Africa. It was concluded that literature on adult education is still growing as there is also noted growth in adult education programs. The section also looked at some ways in which BOM has been taught, and it was concluded that many ways of teaching BOM exist. It was thus observed that it is important to evaluate which method best suits the teaching of BOM in South Africa which is the basis of this study. The chapter also looked at different learning theories and principles underlying adult learning. These helped to formulate the conceptual foundations that were used in the study. The conceptual framework for the study was drawn from a phenomenological and social-constructivist perspective. Thus, social learning theories were adopted with the Health Belief Model being used to understand behaviour change and how learning could transcend into actual behaviour. The next chapter provides the paradigms and the methodology used in this study.

## **CHAPTER THREE**

### **METHODOLOGY**

#### **3.1. Introduction**

This chapter discusses the different techniques that were used to obtain the data in the research. It provides information on the sampling techniques used, how participants were recruited, the data collection procedures and how the data was analysed. Also discussed, is the issue about how validity and reliability were ensured in the research.

#### **3.2. Design of the Study**

This study adopted a mixed method approach in which both quantitative data and qualitative data was used. Burns (1997) argues that mixed methods employ the use of more than one method of data collection or research in a research study. Mixed methods have been welcomed in the social and human sciences in the past decades (Blanche, Durrheim & Painter, 2006). There are four types of mixed methods which include embedded, exploratory, triangulated, and explanatory methods (Blanche et al., 2006). This study is exploratory and explanatory in nature. The basic research techniques within mixed methods have not yet been fully developed, and thus they still use techniques from both quantitative and qualitative techniques (Neuman, 2002). In this case, statistical type data in the form of test scores were used to identify the differences in performance between the groups.

In the present study, qualitative data in the form of written essays were used to explain the different factors that accounted for the observed differences in the quantitative data. In addition, the qualitative data was also used in the explanation of participant's willingness to adopt the use of BOM. The essays written by the participants provided insightful accounts of the knowledge they had about BOM. The factors that were also observed during the learning exercises were grouped into themes that were based on commonalities despite their contextual differences.

##### **3.2.1. The type of study.**

This study adopted a descriptive, exploratory and explanatory approach. According to Blanche et al. (2006), these research approaches are used to make preliminary

investigations into a relatively unknown research area. This was logical to use as this study aimed to introduce BOM to South Africa; a context in which it is relatively unknown. The current study provides causal explanations of a phenomena with the aim being to determine which group, with which teaching method, would achieve a better understanding of the BOM (Burns, 1997). According to Patton (1990) in explanatory studies experimental and quasi-experimental designs are used to determine whether variables cause the other. In this study, a quasi-experimental design was used to identify the causal relationship between the type of teaching method and students' performance and levels of understanding of BOM. The variables in the study were teaching methods and performance which was measured through test scores.

Using the quasi-experimental design, method, two groups were exposed to different teaching methods, and their respective performances, were, in turn, analysed the data from the control group as the baseline. The first experimental group was given homework to enable them to acquire an understanding of BOM. The second experimental group included participants who were actively taught using the lecture method. The control group comprised of participants who were not exposed to any treatment method and the data from this group was used as the baseline. The aim was to identify which teaching method would produce better results and could be adopted to enhance the use of BOM.

The research methodology has also been drawn from a mixed methods perspective. Details in relation to the sampling, data collection, and data analysis are explained in the later part of this chapter.

### **3.3. Location of the Study**

The study was conducted at the two campuses of the University of KwaZulu-Natal: Pietermaritzburg and the Howard College, Durban. The majority of the data was collected from the Pietermaritzburg campus which is located in Pietermaritzburg, which is the capital city of the KwaZulu-Natal province.

### **3.4. Study Population**

The population of interest was male and female postgraduate students from the University of KwaZulu-Natal at Pietermaritzburg and Howard campuses.

#### **3.4.1. Inclusion and Exclusion Criteria.**

Only postgraduate students were used in the sample. All genders and races were included in the study. The factor of age as a criterion was not used. However, the year of study as a variable was recognised in the classification of the study participants.

### **3.5. Sampling Techniques and Sample Size**

In the present study, convenient/ purposive sampling technique was used in the recruitment of study participants. In this case, 60 male and female participants were selected by availability and interest. According to Durrheim (2006), this type of sampling is embedded in social constructivist approaches. Convenient sampling is based on the availability and willingness of members of a given target population to participate in the study. In the present, purposive sampling technique has been chosen because it is ethical, giving people a choice to participate or not to participate in the study (Burns, 1997). According to Durrheim (2006), this method also involves the selection of participants based on the characteristics of interest to the researcher. In this case, the participants were both male and female who are sexually active and who need information about fertility management. As BOM is an important topic, students showed their willingness to participate by calling or emailing the researcher. Due to the failure in getting more participants using the purposive sampling technique, the researcher also used snowball sampling. According to Neuman (2002) and Blanche et al. (2006) snowball sampling has been successfully used to get participants that are not easily available. In most cases, it is easy to get participants from the reference by the few available. In this case, those who volunteered to participate were also asked to bring their friends to the meetings, which most of them did.

### **3.6. Research Instruments**

One category of the data for the study was collected from the experimental study. For purposes of the experimental process, the participants agreed to participate and signed an informed consent and group confidentiality pledge (See Appendices 3, 4 and 5 for information sheet, consent form and group confidentiality pledge respectively).

Participants were assigned to different groups (1 control group and 2 experimental groups). To establish the baseline data, a control group was set up. This control group was not exposed to any treatment condition (that is, they were not taught and did not receive any reading assignment about



BOM). However, they were given the same achievement test (an essay test on BOM) that the other groups were given. Their results were used as a measure in which the performance of the two experimental groups was analyzed.

For purposes of examination, the two experimental groups were exposed to different teaching methods. The first experimental group named Group 2 was assigned relevant readings on the BOM and the way it works. They were given the booklet titled *Teaching Natural Family Planning Naturally: Step by step, cycle by cycle* by Dr. Francesca Kearns and Denis L. St. Marie. The participants were also encouraged to use other sources they could find. After the self-study, the participants were given a test on the BOM. This test was similar to that administered to the other groups. In conclusion, this form of self-study constituted one of the teaching methods that were investigated in the study. The second experimental group, Group 3 was taught in a lecture format. Three (3) lectures were arranged with different participants. These groups were given the same handout like the one given to the first group. The lectures were facilitated by the researcher and his supervisors, and they were an hour long, in each case.

As mentioned earlier, the three groups were instructed to write an achievement test, developed by the researcher and crosschecked and endorsed by his supervisors, which was an essay about BOM as a test after exposure. See Appendix 5 for essay test question. The tests were then marked, and the test scores were analyzed (see next section for data analysis). Post-testing of the groups was also planned in which they were to be asked to write another essay about BOM. In this case, the scores were intended to be used to assess the retention rate of the information which would have given insight into which of the two teaching methods evaluated during the experimental process is easy to remember. Initially, the researcher had planned to run both pre-testing and post-testing sessions however, participant turnout was very low. Hence it was considered reasonable to just assess the participants once.

### **3.6.1. Evaluation materials.**

As earlier noted, the test that was used to assess the knowledge of the participants was developed by the researcher and the supervisors. The questions in the achievement test were mostly derived from the teachings of BOM. These questions focused on such themes as the following, Knowledge on BOM, how to make observations of fertility, the

advantages, and disadvantages of BOM and the special cases that must be considered before people could use the method. In this case the participants would have to show understanding in the key areas of BOM. The last question was on the participant's willingness to use the other existing fertility management methods after being exposed to BOM and, in most cases, the motivation is influenced by its strength and advantages.

### **3.6.2. Validity and Reliability.**

As descriptive and explanatory studies seek accurate observations, accuracy, and consistency were observed. Generalisation is one important quality of scientific research (Burns, 1997). As a quasi-experimental study, it was not possible to randomise the participants to achieve true experimental generalisation. Although randomisation could not be achieved, the selected sample groups were assigned to different experimental teaching methods. In addition, the use of more than 40 participants per group was helpful in assisting the researcher to capture some characteristics of the UKZN female student population. Generalization was also promoted by selecting participants with relevant characteristics that needed to be assessed; for instance, those who are sexually active, in committed relationships or wanted to know more information regarding family planning.

#### **3.6.2.1. *Validity.***

Validity is an important component of quantitative measurement and means that the concept that is being measured (in this study students' knowledge about BOM) is actually what is being measured rather than some other concept (Blanche et al., 2006). There are different types of validity, however, in this experiment; content validity which is the extent of knowledge acquired about BOM was emphasized. This is because the test is largely an achievement test. In addition, predictive validity which measures the extent to which a tool can predict a future event of interest was ensured by post-testing the groups to see if they still remembered what they learnt. The retention rate was used to determine if each teaching method was effective, and to what extent. In addition, validity was also enhanced in the study through the triangulation of tools of analysis, that is, the use of ANOVA and Wilcoxon test (Blanche et al., 2006; Green & Salkind, 2010).

### **3.6.2.2. Reliability.**

The use of the control group was expected to increase the reliability of the results. This is because the control group was deprived of the experimental conditions in order to test the influence of the independent variable which is the teaching method. In this case, one minimized the effects of other variables other than the single independent variable. Control groups eliminated alternative explanations caused by experimental errors and other extraneous variables (Burns, 1997; Campbell, 1988). This research also used the test-retest method as the students were tested twice after being exposed to the different teaching methods.

The term reliability refers to the extent to which the instrument yields consistent results on tested trials. The study was piloted with a smaller sample of 10 participants per group to test the reliability. If the teaching method was to be deemed reliable, then the test scores of the participants should reflect the effectiveness of the teaching method. Reliability is the degree to which the same instrument provides a similar score when used repeatedly (Neuman, 2002). The factor of rigour was introduced in the study design through the processes of instrument triangulation (more than one teaching method was used), sample group triangulation (more than one sample group took part in the study) and testing triangulation since repeated test administration was used (Durrheim, 2006; Neuman, 2002). It was assumed that with this rigorous process, both the validity and the reliability of the study would be enhanced.

## **3.7. Data Analysis**

The data from the study was analyzed using Statistical Package for Social Sciences (SPSS). According to Coaks and Steed (2009) and Blanche et al. (2006), SPSS is believed to be one of the most popular statistical packages which can perform complex data manipulations and analysis with simple instructions. SPSS was chosen for the analysis as it is one of the recommended software for statistical analysis in the Social Sciences. Blanche et al. (2006) argue that SPSS is a comprehensive programme with easy to use pull down menus. The study used One-Way Analysis of Variance (ANOVA) as the primary test for data analysis. The ANOVA was used to determine whether there were any significant differences between the means of three or more groups. The

one-way ANOVA compares the means between the groups one is interested in and determines whether any of those means are significantly different from each other (Coaks & Steed, 2009; Green & Salkind, 2010). In the present study, groups were measured for significant differences. Coaks and Steed (2009) argue that a statistically significant t-test result was one in which a difference between two groups was unlikely to have occurred because the sample happened to be atypical.

One-way ANOVA was used instead of running multiple t-tests. In cases where one conducts a t-test, there is a chance of making a Type 1 error which is usually 5%. This implies that if two t-tests are run on the same data, the chance of "making a mistake" increases to 10% (Blanche et al., 2006; Neuman, 2002). One may thus conclude that when comparing three groups as in the present study, using multiple t-tests would be misguided as there would be a higher error rate which makes the findings invalid and unreliable.

An ANOVA analysis controls for these errors so that the Type 1 error remains at 5% and one can be more confident that any significant result one finds is not just due to chance (Green & Salkind, 2010; Durrheim, 2006). The Fishers Test of Least Significant Difference (LSD test) for sample One-way ANOVA was used as a post hoc test to identify if the paired differences were significant. In summary, One-way between groups ANOVA was used in this experiment because it has been advocated by many scholars who seek to compare different groups. ANOVA was used as it was prescribed by Durrheim (2006) who suggested that it was the best analysis process to use when a researcher is interested in estimating differences, which is one of the interests of this study.

The variables investigated in the present study were the teaching method and the performance in the test. In this analysis, the data obtained from the tests administered was analyzed to see which group (control group and the two experimental groups) performs better than the other. The group with the highest mark was identified as being exposed to the better teaching method. Descriptive statistics were done, and means were compared to see if there were any significant differences in performances between the control group and the two experimental groups. In analysing the data, the measures of central tendency including the mean and median were used to summarise the data sets. The mean was mainly used as it takes all the observed values into account in deriving an estimate. In sum, the above descriptive statistics were chosen as they allowed the researcher to describe the distribution of the test scores of the different groups.

The Friedman test is the non-parametric alternative to the one-way ANOVA with repeated measures (Blanche et al., 2006). It was used in the present study to test for differences between groups when the dependent variable being measured was ordinal. The Wilcoxon Signed-rank Test is a non-parametric statistical test used when comparing two related samples, matched samples, or repeated measurements on a single sample to assess whether their population mean ranks differ (that is, it is a paired difference test) (Green & Salkind, 2010). It is used as an alternative t-test for matched pairs or the t-test for dependent samples when the population, like in the present study, cannot be assumed to be normally distributed.

In understanding the processes and factors to consider when teaching BOM, thematic analysis was used. This method of analysis was chosen because according to Van der Riet (2009) one of the commonly used forms of analysis in qualitative research and is said to be ideal for exploratory studies such as the current study. Thematic analysis involves the identification, examination, and recording of patterns or themes within data (Braun & Clarke, 2006; Neuman, 2002). Such themes or patterns in the data are argued to be important to the description of a phenomenon. Braun & Clarke (2006) further argue that thematic analysis organizes and describes data sets in detail and goes further to interpret various aspects of the research topic. In this study, this analysis was used to answer the research questions around the factors and processes involved in learning as well as the possible barriers to the learning of BOM. In the current study, themes were identified from the responses of the participants. Data from individual cases were identified as of interest in the analytic interest in the topics of factors and processes as well as barriers to learning and adopting BOM. All instances where such data was observed from other participants were also noted. These themes were noted down and combined into themes based on how frequent they were observed.

### **3.7.1. Triangulation.**

Blanche (2006) defines triangulation as the use of multiple perspectives against which to check one's position. In this case, methodological triangulation was adopted in both the research design (using mixed methods) as well as in the data analysis process, through the use of different statistical techniques such as ANOVA, the Friedman Test and the Wilcoxon test.

### **3.8. Ethical Considerations**

The researcher was mindful of ethical considerations in carrying out this study. Most of the ethical guidelines were derived from Wassenaar (2006) who argued that all researchers should follow proper guidelines to be considered ethical. The first guideline is informed consent. Wassenaar (2006) pointed out that participants have to be informed about the nature of the study and that they should willingly participant in the process. In this study information on the study was provided in the information sheet (See Appendix 3) which described the full nature of the research and what the participants were required to do. Those who were willing to participate signed a consent form which detailed that their participation was voluntary and confidential and that they were free to withdraw, should they wish, at any stage of the study (Neuman, 2002).

#### **3.8.1. Confidentiality and anonymity.**

In the present study, no names were used. The participants were informed not to put their names on the answer sheets. The information that contained participant names such as the consent forms were stored separately from the test scripts. Participants were also asked to sign a group confidentiality pledge since the lessons and tests were done in a group setting and as such, the participants saw each other. The pledge was a guideline designed to ensure that the names of the participants would remain anonymous.

#### **3.8.2. Favorable risk ratio.**

Participants in the study were informed about the risks and benefits of participating. It was not anticipated that risk would be high. Participants would largely benefit from learning a new method that is highly effective and useful to them, if they choose to use it.

#### **3.8.3. Fair selection of participants.**

In the present study, participation was voluntary, and the recruitment was based on interest in learning of BOM. The sampling process ensured that participants were selected fairly and representative of the target population.

#### **3.8.4. Independent ethical review.**

The study was independently reviewed and approved by the Research Ethics Committee to ensure that it was ethically sound.

#### **3.8.5. Storage and dissemination of results.**

The test scripts from the study together with the consent documents will be stored in a secure file in the first supervisor's office. The study results will be made available at the University of KwaZulu-Natal library, and there is a possibility of publication from it, in a local journal.

### **3.9. Summary**

This chapter presented a detailed description of the research methodology and design that was used in conducting the empirical study. The purposive and snowball sampling strategies were also discussed. A description of the participants who took part in the study was also provided, as well as the steps that were taken to obtain the final data. The chapter also provided a description of how the data was analysed using the SPSS. Thematic analysis was used to identify the qualitative data that answered questions around factors and processes to be considered for successful teaching of BOM as well as possible anticipated barriers to learning. Issues relating to validity, reliability and generalisability were also addressed. The next chapter presents the results of the study.

## **CHAPTER FOUR**

### **RESULTS OF THE STUDY**

#### **4.1. Introduction**

In this chapter, the results of the empirical study are presented. The chapter provides an outline of the different marks that the participants obtained in the achievement test they were given as well as the frequency distribution for each group. Also presented is a descriptive analysis of the distribution of respondents as well as the qualitative descriptions of participant's views on adopting BOM as a form of fertility management. The chapter ends with a summary presentation of the research findings and highlights of how the knowledge of BOM was enhanced and which teaching method produced better results. The presentation is organised in line with the research questions that were being investigated.

#### **4.2. Research Question 1:**

**Which of the following two methods (the Lecture Approach or the Assignment Method) will give more significant results as a way of teaching the use of BOM to adult learners?**

The following data shows the results of the analysis made to compare which of the teaching methods would result in more effective learning of BOM. The table of the results (test marks) in the achievement test are found in appendix 8. The achievement test was marked out of 25 and the marking was based on the marking scheme provided in appendix 7. These raw scores are the basis on which the statistical analyses were made. This section provides the results from the different analysis used to test for significant difference in performance between the control group, homework group and the lecture group.

##### **4.2.1. Frequency distributions of test scores in the achievement test per group.**

The following frequency tables present the distributions of scores for each group. The frequency table shows the number of times that the marks occur in each group. Based on the frequencies it can be observed that frequent high marks are in the groups that were exposed to a teaching method. In this case, the lecture group particularly had the highest frequent scores than the control group and homework.



Table 2 below shows the frequency distribution of the test scores for the control group.

**Table 2: Frequency distributions (test scores - Control group)**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	1	5.0	5.0	5.0
	3	1	5.0	5.0	10.0
	5	2	10.0	10.0	20.0
	6	1	5.0	5.0	25.0
	7	3	15.0	15.0	40.0
	8	2	10.0	10.0	50.0
	9	2	10.0	10.0	60.0
	10	1	5.0	5.0	65.0
	11	2	10.0	10.0	75.0
	12	3	15.0	15.0	90.0
	13	1	5.0	5.0	95.0
	17	1	5.0	5.0	100.0
Total		20	100.0	100.0	

Frequency distributions in Table 3 above show that in the control group, the frequent marks are 2 and 7. These scores are among the lowest scores obtained in the achievement test.

Table 3 below shows the frequency distributions for the homework group in the achievement test.

**Table 3: Frequency distributions (test scores - Homework group)**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	7	1	5.0	5.0	5.0
	8	1	5.0	5.0	10.0
	10	3	15.0	15.0	25.0
	11	2	10.0	10.0	35.0
	13	2	10.0	10.0	45.0
	14	1	5.0	5.0	50.0
	15	2	10.0	10.0	60.0
	16	1	5.0	5.0	65.0
	17	1	5.0	5.0	70.0
	18	2	10.0	10.0	80.0
	19	3	15.0	15.0	95.0
	20	1	5.0	5.0	100.0
	Total	20	100.0	100.0	

Frequency distributions in Table 3 above show that in the homework group the frequent marks obtained by the participants in the homework group were 10 and 19 in the achievement test. These are higher frequent numbers as compared to that of the control group that had 2 and 7 as the frequent test marks.

Table 4 below shows the frequency distribution of marks from the lecture group in the achievement test.

**Table 4: Frequency distributions (test scores - Lecture group)**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	13	1	5.0	5.0	5.0
	16	2	10.0	10.0	15.0
	17	2	10.0	10.0	25.0
	18	1	5.0	5.0	30.0
	19	1	5.0	5.0	35.0
	20	4	20.0	20.0	55.0
	21	1	5.0	5.0	60.0
	22	2	10.0	10.0	70.0
	23	3	15.0	15.0	85.0
	25	3	15.0	15.0	100.0
	Total	20	100.0	100.0	

Frequency distributions in Table 4 above show that in the lecture group, the frequent marks that were obtained by the participants in the achievement test were 20, 23 and 25. These are notably the highest marks that were obtained by participants in the achievement test.

#### 4.2.2. Descriptive Analysis of Distribution: One-way between groups ANOVA.

Table 5 below shows the descriptive statistics of the test marks that were obtained by participants in the three different groups (control group, homework group and lecture group).

**Table 5: Descriptive Statistics of test scores in the achievement tests per group**

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	20	8.70	3.658	.818	6.99	10.41	2	17
2	20	14.15	4.043	.904	12.26	16.04	7	20
3	20	20.25	3.354	.750	18.68	21.82	13	25
Total	60	14.37	5.986	.773	12.82	15.91	2	25

Table 5 above shows the descriptive analysis of the distribution of the participants' test scores. The table provides the various means, medians, standard deviations and variances between the different groups (control, homework, and lecture).

The results show that the lecture group had the highest mean with a score of 20.25. The homework group had the second highest mean with a score of 14.15. The control group had a mean score of 8.70. There was a noticeable difference in the means showing that those exposed to teaching methods performed better as compared to the baseline. If the median is considered the lecture group is also a higher score of 20 and the other scores being 14.50 and 8.50 respectively. In conclusion, there is a difference between the groups with the lecture group performing better than the other groups.

#### Assumptions of ANOVA testing: homogeneity of variance

Table 6 shows the results of the test for homogeneity of variance in the data set.

**Table 6: Test of Homogeneity of Variances: Performance on achievement test**

Levene Statistic	df1	df2	Sig.
.791	2	57	.458

Table 6 shows that the assumption of homogeneity of variance has not been violated. This means that all groups have the same or similar variance.

The following table, (table 7) shows the results of the ANOVA which was used to test the significant differences in performance between the control group, homework group and the lecture group.

**Table 7: ANOVA test for significant difference: Group Performance**

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1335.433	2	667.717	48.889	.001
Within Groups	778.500	57	13.658		
Total	2113.933	59			

Table 7 above shows the results from the ANOVA test which were used to assess the differences in performance between the control group, homework group, and the lecture group. The data from Table 8 above indicate that in the analysis, the p-value 0.001 is less than alpha (sig 0.001 is less than  $\alpha$ , 0.05) therefore we the null hypothesis is rejected and it is concluded that there are significant differences in performance between the control group, homework group and the lecture group.

### Post Hoc Tests

The following table shows the data from the Fishers LSD post hoc test for a significant difference between the control group and experimental homework and lecture group.

**Table 8: Multiple Comparisons between the Groups: Fishers LSD**

(I) group	(J) group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	-5.450*	1.169	.000	-7.79	-3.11
	3	-11.550*	1.169	.000	-13.89	-9.21
2	1	5.450*	1.169	.000	3.11	7.79
	3	-6.100*	1.169	.000	-8.44	-3.76
3	1	11.550*	1.169	.000	9.21	13.89
	2	6.100*	1.169	.000	3.76	8.44

Table 8 above shows the results of the Fishers LSD test for sample One-way ANOVA. The table shows that the paired differences between group 1, 2 and 3 were significant. The table above shows that the f-ratio is significant (sig 0.001). Thus, it can be concluded that the means differ significantly. This is in line with both the Friedman test and Wilcoxon tests, which indicated that the findings of the three groups under study had significant differences. Based on the above, it is concluded that there are significant differences in performance, among the control group, homework group and lecture group. Based on the above results, it is also noted that using the lecture group produces better results as compared to using homework method.

The following table (Table 9) shows the plot of the means of the three experimental groups which was also used in evaluating the effectiveness of the different teaching methods.

**Table 9: Means Plots for the groups**

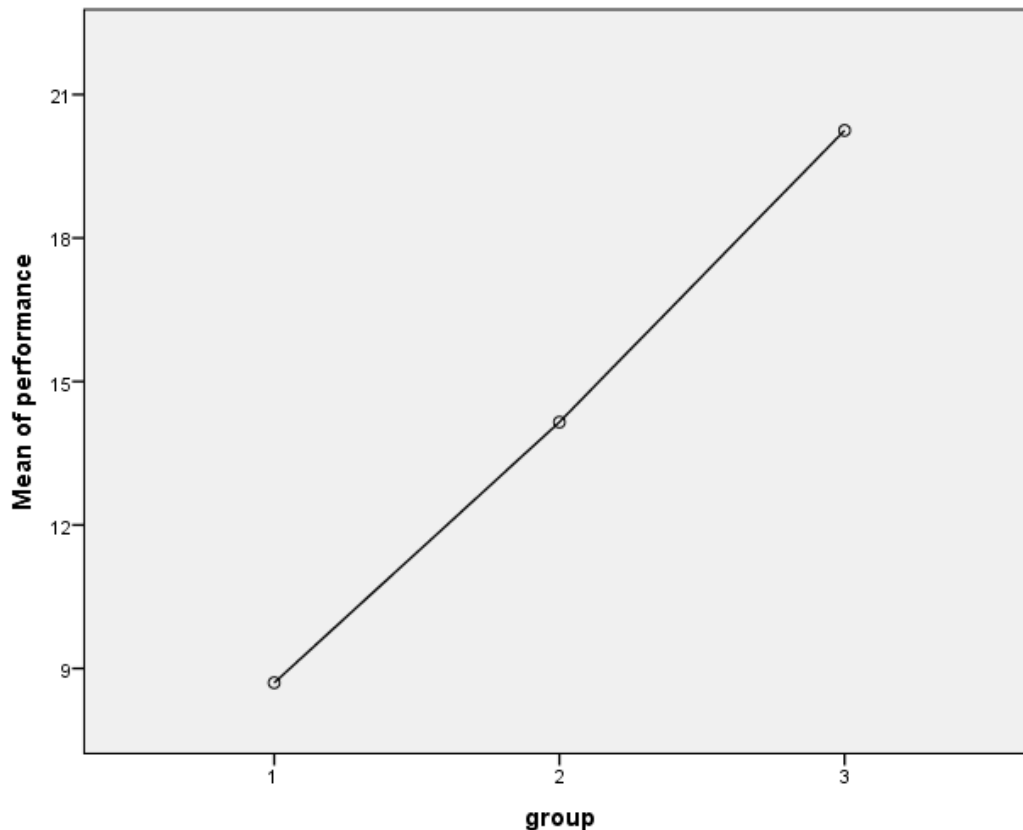


Table 9 above shows the mean plots of the different groups. Group 1 (control group) had a mean below 9, group 2 (homework group) had a mean below 15 and group 3 (lecture group)

had a mean score that was higher than 18. The table suggests that the differences found between the groups are significant, with the lecture group having a higher mean. Each dot represents a sample mean. Each interval is a 95% confidence interval for the mean of a group.

### **Friedman test for significant difference**

Table 10 below shows the mean ranks that were produced by the Friedman test for significant difference between the control group, homework group and lecture group.

**Table 10: Mean Ranks**

	Mean Rank
Control	1.08
Homework	2.15
Lecture	2.78

The table above indicates that based on mean ranks, the lecture group has a highest mean followed by the homework group and lastly the control group.

The following table presents the data the chi-square statics from the Friedman test for significant difference in performance between the three experimental groups.

**Table 11: Friedman test: Chi- square**

Chi-square Statistics	
N	20
Chi-Square	30.727
df	2
Asymp. Sig.	.001

Table 11 above presents the test statistics which are the Chi-square 30.727, degrees of freedom (df) 2 and the significance level (Sig. 0.001). These are important in reporting the result of the Friedman test. From the above table, it can be seen that there are 1 statistically significant differences between the overall mean ranks of the related groups. Thus, it can be concluded that there are significant differences between the three groups. It is important to note that the Friedman test, as an omnibus test, provided the overall differences and identified the extent to which each group differed from the others. The results of the test show that all the experimental groups had significant differences in performance.

The Wilcoxon Signed Ranks Test was also used as a post hoc test to identify the differences in performance between the groups. The following table shows the results of this test.



**Table 12: Wilcoxon Signed Ranks Test: Ranks based on performance per group**

3		N	Mean Rank	Sum of Ranks
Homework - Control	Negative Ranks	1 <sup>a</sup>	4.50	4.50
	Positive Ranks	19 <sup>b</sup>	10.82	205.50
	Ties	0 <sup>c</sup>		
	Total	20		
Lecture - Control	Negative Ranks	0 <sup>d</sup>	.00	.00
	Positive Ranks	19 <sup>e</sup>	10.00	190.00
	Ties	1 <sup>f</sup>		
	Total	20		
Lecture - Homework	Negative Ranks	3 <sup>g</sup>	3.17	9.50
	Positive Ranks	15 <sup>h</sup>	10.77	161.50
	Ties	2 <sup>i</sup>		
	Total	20		

Homework > Control

Lecture > Control

Lecture > Homework

Table 12 above shows the positive and negative ranks, based on the comparisons of the control group, homework group, and lecture group. The paring suggests that the homework group and lecture group performed better than the control group. The lecture group also performed better than the homework group.

The following Table 13 shows the results of the comparisons of performance between the control group, homework group, and the lecture group.

**Table 13: Wilcoxon signed to test for significant difference**

	Homework- Control	Lecture - Control	Lecture - Homework
Z	-3.758 <sup>b</sup>	-3.826 <sup>b</sup>	-3.315 <sup>b</sup>
Asymp. Sig. (2-tailed)	.000	.000	.001

Table 13 above shows the output of the Wilcoxon signed ranks test which was used to identify the differences between the three groups. The tests showed that there is a significant difference in performance between the control group and the two experimental groups. There is a significant difference between the control group and the experimental groups (sig 0.001 which is less than 0.05). There is also a significant difference between the control group and the lecture group (sig 0.001 is less than alpha 0.05). There is a significant difference between the lecture group and the homework group (sig is 0.01); therefore there are significant differences in performance between the homework group and lecture group with the lecture group performing better.

#### **4.2.3. Best teaching method for teaching BOM as indicated by test results.**

Based on the data above, the lecture method is the best way of teaching BOM. The frequency distributions, descriptive statistics (means and medians), ANOVA test, Friedman Test and the Wilcoxon signed ranks test indicate that the three groups had significantly different means. The lecture group had the highest performance followed by the homework group and lastly the control group. This indicates that when tested, the groups exposed to a lecture teaching method have higher performance outcomes as compared to those who engaged self-directed learning.

The best teaching method was determined by comparing the performance of the different teaching methods in the achievement test. The results of this investigation show that the lecture group had the highest marks in the test. In the analysis, this group had both the highest means and the highest median. The analysis also indicates that the lecture group had significantly higher performance as compared to the homework group and the control

group. In this case, it can be argued that directly engaging with participants that wish to use BOM significantly increases their knowledge and skills.

The use of homework was also noted to have improvements in participants understanding of BOM. Their performance was significantly better as compared to that of the control group. Although their performance was lower than that of the lecture group participants from the homework group could explain key concepts of BOM. Thus, using homework to teach adults was also associated with increased knowledge of BOM. From this analysis, it can be concluded that by performance, using the lecture method, which involves actively engaging with participants, is the best method to use when teaching adults how to use the BOM. However, the assigning of homework also resulted in a significant improvement in the awareness of the BOM.

#### 4.3. Research question 2:

**What factors (principles and processes) are required for effective adult learning of BOM?**

The results of this study in relation to the above question are summarized in Table 14 below.

**Table 14: Frequency distributions of factors and processes affecting learning**

Factor/process	Frequency for control group	Frequency for homework group	Frequency for lecture group	Total frequency
• Interest and motivation	3	9	15	27
• Participation	0	5	20	25
• Group work	0	0	20	20
• Facilitated sharing	0	0	15	15
• Problem solving	5	6	12	23
• guided learning	0	6	14	20
• Prior knowledge	2	3	8	13
• Good learning environment	2	4	8	14
• Self-discovery	0	4	2	6

Table 14 (above) shows the frequency of the factors and processes that were identified by the participants to be helpful in their learning. The table indicates these factors include interest and

motivation, participation (including group work and facilitated sharing) and problem-solving. In addition, other factors were prior knowledge and good learning environment.

Interest and motivation, problem-solving and a good learning environment were identified as important factors in all the three groups (control homework, and lecture groups). The factors: interest and motivation had the highest frequency of 27, followed by participation which had a total frequency of 25. Closely related to participation facilitated sharing and guided learning which also had high frequencies of 20 respectively. Table 14 also shows that many people participated because they wanted to learn the method for problem-solving. Problem-solving had a total frequency of 23. Other factors noted include prior knowledge, self-discovery and a good learning environment which had frequencies of 13, 6 and 14 respectively. These factors are summarised in the table below.

**Table 15: Factors and processes required for effective adult learning of BOM**

Factors and processes that are required for effective adult learning of BOM				
GROUP TYPE	Control group	Homework group	Lecture Group	
Form of teaching	No teaching	Self-directed	Direct teaching	
Ranked Factors and processes	<ul style="list-style-type: none"> <li>• Interest and motivation</li> <li>• Prior knowledge</li> <li>• Problem solving</li> </ul>	<ul style="list-style-type: none"> <li>• Motivation and interest</li> <li>• Self-discovery</li> <li>• Environment of learning</li> <li>• Problem solving</li> <li>• Use of internet</li> </ul>	<ul style="list-style-type: none"> <li>• Motivation and interest</li> <li>• Participation</li> <li>• Prior knowledge</li> <li>• Guided discovery</li> <li>• Environment of learning</li> <li>• Problem solving</li> <li>• Group work</li> <li>• Facilitated sharing</li> </ul>	

Table 14 above shows factors and processes that are involved in the learning of BOM as identified in the experiment. These results are further discussed below.

#### **4.3.1. Interest and Motivation.**

The findings of the current study show that the majority of participants were interested and motivated in using BOM after exposure to the teaching methods. Some participants also

mentioned that interest in natural family planning methods was among the driving factors that encouraged participants to take part in the study. In addition, they listed some of its advantages as compared to existing methods such as the absence of side effects. Participants also mentioned that they would adopt this method as it can be used in avoiding pregnancy and achieving pregnancy as well as sex selection of babies. Most of the participants in the homework and lecture groups showed interest in using the BOM after the experiment. However, they expressed concerns that they had limited and inadequate knowledge in relation to this method. One of the participants in the homework group, when asked about his willingness to adopt the use of the method, argued the following, “I would be confident to use the method, however, since it is technical I would be reluctant to start it without thorough instruction”. This suggests that she felt that homework alone does not give her the basis of using the method but that she would require extensive learning with the help of instructors. Thus, though there is increasing interest, participants are not fully confident of using the method. The participants further highlighted the fact that they also needed further training how to use the method. The participants who were taught about BOM expressed willingness to use the Billings’ Method. They were motivated by its advantages over existing methods. However, they expressed concerns about the technicality of the method and how it may not be wise to use given the reality of infidelity and multiple partners. In conclusion, most participants in the study were keen in adopting BOM to safeguard their health as well as relationships and marriages.

#### **4.3.2. Participation.**

The other principle factor identified in the study was participation. Participants in the study mentioned that participating in the learning process was beneficial to them. 25 participants in the study noted that participation was critical to their learning. One of the participants reported that he benefited from being asked questions as compared to the researcher telling them everything. Another participant argued that she benefit from the group tasks as it enabled her to share some of her experiences with natural contraception. Other participants also mentioned that they benefited from guided discovery in which the researcher facilitated the learning process. In addition, many participants reported that group tasks

also increased their understanding. In the lecture method, participants were also encouraged to share their experiences in using various forms of contraception.

#### **4.3.3. Guided learning and Self-discovery.**

A majority of participants in the lecture group reported that they benefit from the guidance of the lecturer and supervisor. A female participant in the lecture group reported that the researcher was able to give clarification to some aspects that were confusing such as how to identify the safe days to engage in sexual relations. She also added that the supervisor was able to expand on that which made it even clearer. On the other hand, participants in the homework group noted that they benefited from self-discovery. 4 participants in the homework group mentioned that they enjoyed learning on their own as they were able to learn at their own time and using different resources such as the internet on top of the resources that they had been given by the researcher.

#### **4.3.4. Prior knowledge of BOM.**

In the current study, 13 participants out of the 60 who wrote the achievement test reported that they had at some point heard of BOM. The remaining 47 participants indicated that they were not familiar with BOM. Despite this, a good number reported that they were familiar with other forms of natural family planning methods such as the calendar method, and they could give brief descriptions of the method. Other participants were of the opinion that BOM was the same as the calendar method and as such were not familiar with how to make observations of fertility and identifying ovulation. Although these participants reported that they had some understanding of BOM they had never used it before.

#### **4.3.5. Good Learning Environment.**

Another important factor identified by the participants in the study was a good learning environment. The participants in the homework and lecture groups mentioned that they enjoyed the relaxed environment. One of the participants in the lecture group mentioned that the venue was familiar and was the same as the method of instruction that was used in their department. There was a general idea from the participants in the lecture method that the environment allowed them to learn through play as they were able to have fun and share jokes. As such, one female participant also mentioned that they felt free to participate and

did not feel judged or evaluated. Similarly, participants argued that they study at home during their free time which was convenient for them.

#### **4.3.6. Learning for Problem-solving.**

The participants were motivated to learn about BOM because they were facing challenges when using existing methods. In the current study, 23 participants from all the groups (control, homework and lecture groups) reported that they were interested in trying out BOM. In this case, they had an interest in improving their knowledge and skills on natural family planning and thus volunteered to learn about BOM. The participants also noted having experienced side effects when they were oral contraception such as family planning pills. A participant in the homework group was fascinated by the fact that BOM could be used for sex selection. She mentioned that she had given birth to two girls, and the husband was expecting a male child which had resulted in him looking to other women for a male child. Another female participant who had also visited many specialists after failing to conceive was also keen to use BOM as it could be a possible solution to her problems. In conclusion, a good number of participants were interested in learning about BOM because they had existing challenges that could have been solved by the BOM.

In summary, the study identified a number of factor and processes that were driving participants to want to adopt BOM. It also identified the key things that participants felt were helpful in their learning of BOM which include participation, group work and a good learning environment. A good number of participants were exposed to other forms of natural fertility management such as the calendar method and a few were familiar with BOM but had never used it. Participants showed interest in learning about BOM during recruitment as well as after they had been exposed to how BOM works. Although the participants were optimistic in learning BOM they expressed concern about a number of things that are presented in the next section.

#### **4.4. Research question 3:**

##### **What are some of the barriers to take into account in the effective teaching BOM?**

The results of this research in relation to the above research question are presented in Table 16 below.

**Table 16: Barriers to learning and adoption of BOM**

<b>Barriers to the learning per group</b>		
<b>Control group</b>	<b>Homework group</b>	<b>Lecture group</b>
<ul style="list-style-type: none"> <li>• Time constrains</li> <li>• Resistance and task avoidance</li> </ul>	<ul style="list-style-type: none"> <li>• Time constrains</li> <li>• Resistance and task avoidance</li> </ul>	<ul style="list-style-type: none"> <li>• Time constraints</li> <li>• Language used</li> <li>• Resistance and task avoidance</li> </ul>
<b>Barriers to the adoption of BOM</b>		
<ul style="list-style-type: none"> <li>• Technicality of BOM</li> <li>• Lack of trust</li> </ul>	<ul style="list-style-type: none"> <li>• Technicality of method</li> <li>• Infidelity</li> <li>• Lack of trust</li> <li>• Sexually transmitted diseases</li> </ul>	<ul style="list-style-type: none"> <li>• Nature of Morden relationships:</li> <li>• Multiple partners</li> <li>• Infidelity</li> <li>• Lack of trust</li> <li>• Technicality of the method</li> </ul>

Table 16 above shows the various barriers to learning that were identified in this study. There were a number of factors that were seen as a hindrance to the both the learning and adoption of BOM as a method of contraception. These include the technicality of the method, time constraints and the nature of the modern relationship. In addition,

#### **4.4.1. Technicality of BOM.**

One of the participants argued that, “I would be confident to use the method; however since it is technical I would be reluctant to start it without thorough instruction”. This suggested that she feels that homework alone does not give her the basis of using the method but would require extensive learning with the help of instructors. Thus, though there is increasing interest participants are not fully confident of using the method. They highlighted the fact that they also needed further training how to use the method. In addition, some of the participants found some of the concepts of BOM as being too technical as compared to the use of condoms or other forms of contraception. Another challenge that was related to the technicality of the method was language. Two (2) participants in the lecture method argued that they could have understood better if the lessons were in IsiZulu. They noted that some of the concepts in BOM were unfamiliar.



Although a few people identified the language as a challenge, it is an interesting barrier to explore further.

#### **4.4.2. Time constraints.**

One of the common problems was that participants were pressed of time. Many participants were either unable to be part of the investigation or failed to come for the evaluation sessions because they had limited time. The study has shown that teaching programs involving adults are likely to be affected by time constrains. In the study participants were selected from post graduate students who were at the time busy submitting research proposals and some submitting assignments. It was also noted that adults are often short of time. In the study the participants volunteered to be part of the investigations. However, there were a number of participants who did not turn up for the evaluation process. Most of the participants were in the lecture group did not come up for the test. Over 40 people were enrolled in this group but only 20 managed to write the test. They mentioned that they had other commitments including classes and work. Others reported that they had to rush home to their children. As a result, time constrains became one of the main contributors to the participants' low turnout as most of the participants who were in the lecture group who ended up not come for the assessment. Most of the participants who did not come for the assessment reported that they had other commitments on the day of testing..

#### **4.4.3. Nature of modern relationships.**

Another problem that was identified was that the participants were worried that although they had learnt about BOM, it was going to be difficult to adopt the method because it would leave them vulnerable to sexually transmitted infections. The participants were concerned that the method would not protect them from STIs as it involves unprotected sex. This was further complicated by the nature of modern day relationships which are characterised by high cases of infidelity and existence of multiple partners. Participants were sceptical of adopting the method citing concerns of infidelity in relationships. A male participant in the lecture group expressed concern of using the method because of lack of trust. According to the participant, "in this day and age people are becoming more and more promiscuous and also a girl might trap you into getting them pregnant on high fertility days". Like other participants, he expressed concern about the use of the method given the

increase of multiple partners as well as girlfriends who they view as not trustworthy. He mentioned that he was willing to use the method in a committed relationship such as in marriage. He argued that he believes that a wife could be more faithful as compared to a girlfriend. It can be summed that most participants were concerned about the nature of modern relationships which are characterised by infidelity and risks of sexually transmitted diseases.

#### **4.4.4. Task avoidance and resistance.**

Although the participants showed interest in learning, some showed signs of task avoidance which could have been due to fears of evaluation. Although the participants in the homework and lecture group showed interest in teaching sessions, very few attended the evaluation session. Some of the participants who had participated in the learning process but did not come for the test reported that they feared that they would fail. In addition, some feared that the demands of the question which were to write a four paged essay were too much. For instance, most of the participants in all the groups did not write the achievement test. Similar observations have been noted in previous studies such as one by (Kim, 2004) who also noted that some adult learners were reluctant to answer the surveys as they feared that their views were incorrect. In this study it was also that some of the participants appeared to be reluctant to engage and they seemed distracted. In addition, a majority of such participants did not come for the evaluation session where they had to write the test which was to be used to evaluate their performance. In summary, task avoidance was one of factors that were observed during the study which created a challenge for the learning of BOM which was related to fear of evaluation.

#### **4.5. Summary of Findings**

In summation, the results of the present study indicate that the lecture method is the best way of enhancing the knowledge and use of BOM. Participants who were exposed to direct teaching performed better compare to the group that was given homework assignments and those who were not exposed to a treatment group. The descriptive analysis of the respondents was provided. The means of the different groups were presented and compared and these indicated that people who have not been exposed to the workings of BOM have little knowledge about the method under study. However, they were familiar with other natural methods such as the calendar method and

had reasonable understanding of safe days for sexual intercourse in women's fertility cycle. The participants who engaged in the lectures on BOM had higher marks in the essays followed by those who were given homework. The findings suggest that when teaching adults actively engaging with them and enabling them to ask questions for clarity produced better results as compared to those in the self-directed study that perform the tasks individually. The next chapter provides a discussion of the results and how they relate to existing literature.

## **CHAPTER FIVE**

### **DISCUSSION AND CONCLUSION**

#### **5.1. Introduction**

Finding the best way of teaching adults and couples has been one of the interests of those who advocate for the use of the Billings Ovulation Method (Billings 2002; Billings & Westmore 1994; Smith & Smith 2014). This chapter presented the discussion of findings of this study, including the implication of the results for the overall program of enhancing people's awareness and knowledge of the BOM. The research findings were discussed with reference to the theories introduced in chapter two as well as the teaching methods that appear in the literature. Participants' opinions and attitudes towards using BOM based on their current knowledge and understanding of the method as noted from the present study was also discussed. The conclusions and limitations of the study, as well as recommendation for professional practice and further research were also highlighted. The discussion of the results was organized in line with the research questions investigated.

#### **5.2. Discussion of Results, Research Question by Research Question**

This section presents a discussion of the results based on the 3 main research questions that are investigated in the study. The research questions are as follows;

##### **5.2.1. Research Question 1:**

**Which of the following two methods (the Lecture Approach or the Assignment Method) will give more significant results as a way of teaching the use of BOM to adult learners?**

The results of this study (highlighted in those tables 7 and 8 in the previous chapter) indicate that there were significant differences in performance between the homework group and the lecture group with the lecture group performing better. In addition, the homework and lecture groups performed significantly better when compared to the control group. This means that the majority of participants who were exposed to the teaching methods had a better understanding of the workings of BOM as compared to those who had no exposure. Similarly, existing literature suggests that directly teaching couples in

workshops, lectures and tutorials is the best way of helping them understand their fertility (Smith & Smith, 2014; Billings 2002).

In the present study, as expected the participants exposed to direct teaching performed better as compared to other groups. One of the reasons why participants performed better was because due to the fact that they were able to participate in the learning process. Similarly, studies by Fenwick et al. (2006) have shown that adults learn mostly through participation as it allows collaboration with peers. In addition, social learning theorists such as Bandura and Vygotsky have also stressed that learners can learn from competent others to reach their potential (Simon & Gagnon, 2011). This could explain why the lecture method worked. The results corroborates with existing literature as the results indicate that when compared, the lecture method was associated with better performance than the homework group (Smith & Smith, 2014).

The results of this study found a significant difference in performance between the baseline (control group) and the results from the experimental group which indicated that participants who were not exposed to any teaching method had limited understanding of BOM when compared to those in the homework and lecture groups. Although their knowledge on BOM was limited, the participants who were not taught had some understanding of natural methods of family planning such as the calendar method. On the same note, Case (1993) has argued that learner's knowledge on new concepts is limited before someone helps them to understand. Vygotsky also shared similar observations when he argued that learners have potential to learn and their knowledge can be improved greatly if they are assisted by a competent other such as an adult or peers who are well informed (Vygotsky, 1978). Billings (2002) also adds that women generally have an understanding of their bodies but may not be aware of the signs of fertility and how to chart them. As such they need guidance on how to use BOM and as such a learning program of using the method is essential. Similarly, Dirkx (2006) argued that most adult learners have some experience that they have accumulated over the years which they often use to help them understand new information especially when there is someone to guide them. It can thus be concluded that the knowledge participants have already around contraception can be seen as their

current knowledge which can be improved if they are taught by a capable other (a teacher) with an understanding of BOM.

This study has shown that although the success of using the method depends on the teaching method as well as the qualifications of the educator, making people aware of such a method may not require such a trained professional. In this research the results are not an indication of participants' full ability to use the method but they act as the foundation in which future programs can be built. There is a general consensus among advocates of BOM that the teaching of the method should be done by a trained professional (Smith & Smith, 2014; Gray et al., 1990; Grims 2004; Billings, 2002). However, if taken from a social learning point of view, a person may not have all the knowledge but can learn from others and mostly from capable others (Simon & Gagnon, 2011). In this study, the researcher was not professionally trained in the method neither did he have a certificate. He was able to educate the participants about BOM and in some session he got the help from his supervisors. It can be seen that the present study was able to seed the knowledge. Similarly, the results from the present study as tabulated in Tables 9 and 12 shows that participants who had received instruction through direct teaching and homework had better marks compared to those who were not exposed to any teaching method. Within the experimental groups those actively taught received more instructions and they had the opportunity to ask for clarity during the lecture times. One may conclude that contrary to common belief, BOM can be taught by any individual who understands the method even though they may not have received professional training and acquired certificates to prove it (Billings, 2002). The successful utilization of the method depends mostly on correctly following the instructions of the method.

In tandem with the above discussion, although the qualifications of the educator are not of paramount importance, his or her ability to give the correct instructions of the method is key. The researcher was able to help the participants understand the BOM by providing guidelines that have been produced by the Billings family. When using BOM it has been argued that correctly following the instructions of the method was identified as critical (Billings & Westmore, 1994; Billings, 2002; McSweeney, 2011). This is in line with the findings of a Nigerian study conducted by (McSweeney, 2011) which focused on sex selection. The study found that on many occasions, failure of the method often rose

from the inability of the couple to follow through with the instruction and rules of the method such as the timing their sexual intercourse. It was also observed that although the couple initially planned to have a baby girl, they timed for a boy and as a result conceived a baby boy (McSweeney, 2011). This implies that teaching of instructions and the participants' ability to follow them through is critical. In conclusion, it can be noted that the introduction of BOM in South Africa would require that the people are exposed to clear instructions as well having the ability to follow them through. It becomes important to reflect how instructions were followed through in the study.

The baseline data from the control group also supports this view as it showed that that students at the university of Kwazulu-Natal have little knowledge about BOM. As evidenced in Table 9 (chapter 4 of this report) most of the participants in the control group knew what BOM was because of the information provided about the research. Table 9 indicates that the control group had a lower mean as compared to the other groups suggesting that their performance in showing understanding of BOM was very limited in comparison with the other groups. This supports the view that peoples' knowledge and awareness of BOM in South Africa is still limited (Nondabula, 2013; Phyfer, 2012). In the present study, some of the participants' responses to the question of what BOM is in the achievement test, the majority responded that they did not know anything about BOM. These findings thus add to existing literature to show that indeed BOM should be introduced and people should be made aware of it (Phyfer, 2012; Nondabula, 2013). The participants in the control group expressed optimism in learning and using BOM. Thus it is important to continue having projects that increases the awareness and use of the method.

The results also show that there was evidence of a qualitative difference in the levels of understanding of BOM. Although the findings are not a result of content analysis, the data supports the view that the type of teaching is likely to affect the type of content that participants are likely to be able to retain. It was observed that participants in the lecture group had an increased understanding of the content of BOM after being taught. Similar observations have also been made in studies on adult education which have shown that adults who learn with guidance have better understanding of the material being taught than adults who engage in self-study (Case, 1993; Blessing et al., 2012). In comparison to the control group and homework group, participants in the lecture groups had a better

understanding of the different concepts and processes that are found in the BOM. The participants in the lecture group could articulate in detail what BOM is and could explain how observations of fertility could be made as well as the advantages and disadvantages of BOM. It can be concluded that the use of a lecture method is not only going to result in better performance but will also result in improved understanding of BOM.

Although using a lecture method is ideal, other methods to teach BOM can be adopted (Smith & Smith, 2014; Billings & Westmore, 1994). The study indicated that both homework and lecture methods resulted increased awareness of BOM among the participants. In the current study the majority of the participants who were taught about BOM were able to demonstrate adequate knowledge of BOM. They were all aware of the different benefits of using natural methods and how it could be a safer way of managing their sexual health. The control group that was not exposed to the teaching methods had significantly little awareness of BOM. In this experiment a range of both formal and informal assessment procedures were conducted by researcher during the learning process to evaluate the participants understanding of the content of BOM. Formative assessments which are often described as tools for improving the teaching-learning process for students were used Fenwick et al. (2006) in order to modify teaching and learning activities to enhance their understanding of the method. In conclusion, the teaching method adopted is likely to affect the quality of the information that people are going to have and direct teaching is more likely to result in better learning outcomes.

#### ***5.2.1.1. Differences in knowledge and understanding after learning about BOM.***

In the experiment the participants had different levels of understanding of the content of BOM that they retained. Other than the quantitative difference in performance between the experimental groups, there was also a qualitative difference in the participants' understanding of BOM between the control group, homework group and the lecture group. Participants who were in the experimental groups (homework and lecture group) were noted to have a better understanding of the BOM. The members of the control group were unfamiliar with BOM. As such they were not able to explain some of the key concepts of the method as well as knowledge on making observations of fertility. However, a good



number of them were able to identify the advantages and disadvantages associated with the use of natural methods. This was because they were aware of other forms of natural family planning especially the calendar method. The findings of the control group are in line with the findings of (Phyfer 2012; Nondabula 2013) who noted that many people at the University of KwaZulu-Natal were not familiar with the BOM.

On the other hand, the homework group and the lecture group were able to define BOM as a natural fertility management method developed in Australia by the Billings family that is based on making observations of the female mucus to determine their fertility (Billings, Billings & Catarinich, 1977). In addition, the participants exposed to teaching were able to explain how a person could make observations of fertility as well as how to avoid or achieve pregnancy. It was observed that the participants in both groups were able to outline the advantages and limitations of using BOM. They highlighted that BOM was natural and thus had no side effects, that it could be used for both avoiding and achieving pregnancy with an extra benefit of sex selection and that it was a cheap form of contraception (Billings, 1978). The participants in the lecture group were able to illustrate the different cases that people have to look out for if they want to use BOM such as when they have an STD, when they have just had an abortion or when they are reaching menopause (John Billings, 1978). Although the participants in the two groups had commendable knowledge on BOM those in the lecture group had a better understanding of the Method than those in the homework group. This could have been due to the nature of the teaching method which was in line with the fundamentals of adult learning which included participation and facilitated sharing.

In the experimental lecture group, interaction with peers was observed to be an effective way of developing skills and strategies of using BOM. Drawing from the teachings of social learning theory, the teacher used cooperative learning exercises where less competent participants developed an understanding of BOM with help from peers who had some understanding of BOM (Van der Riet, 2009). This was done within Zone of Proximal Development (ZPD). It was concluded that providing appropriate assistance gave the participants enough boost to get an understanding of the BOM. The control group was used as the baseline to understand the student's zone of proximal development (ZPD). According to Wertsch (1985) Vygotsky sees the ZPD is that distance between the actual

developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance, or in collaboration with more capable peer (Van der Riet, 2009). It can be argued that the results from the control group were used as the baseline which was used to assess their current knowledge and skills of identifying their fertility before the aid of their peers or trained teacher.

In summary, the experimental groups who were taught on the BOM had different levels of understanding of BOM. Although each group showed improved knowledge and awareness of BOM, some were better than others. As expected, those taught using the lecture method had a better understanding of the core aspects of BOM which was also indicated by their performance in the test (Smith & Smith, 2014). This concurs with the findings of Billings (2002) who argued that BOM requires direct teaching with competent teachers for it to be effective. Despite the fact that those in the control group had limited knowledge on BOM, some of them were familiar with its principle but not its name. In addition, such were aware of other forms of natural family planning such as the calendar method. The participants in the two experimental groups (homework and lecture groups) had improved understanding of the teachings of BOM. Although the two experimental groups had different levels of understanding of BOM they were all able explain the basic principles of the Billings ovulation method. This was commendable given the fact that prior to the experiment very few people were familiar with BOM.

#### **5.2.2. Research question 2:**

##### **What factors (principles and processes) are required for effective adult learning of BOM?**

This study has noted that principle of adult learning that are identified in literature were also identified as important (Johnson et al., 2015). According to data presented in that table 14, the following factors are required for effective adult learning of BOM participation, motivation and interest, prior knowledge and a good learning environment. In terms of processes, one of the common processes identified was on-going formative assessment. Further discussion of the factors mentioned earlier is undertaken below. These factors and

processes are also found in existing research on adult education has identified a number of factors and processes that affect adult learning (Case, 1993; Aitchison' 2003).

#### **5.2.2.1. *Participation.***

The results of this study identified participation as one important factor in the learning of BOM. Similarly, participation is one of the most common factors in adult learning (Van der Riet, 2009; Case 1993; Ellis & Richardson, 2012). As noted by (Van der Riet, 2009; Ellis & Richardson, 2012) participation encouraged participants in this study to work hand in hand with their colleagues. It was also observed that during the lecture, the participants enjoyed the opportunity to interact as it provided a face-to-face opportunity to connect and share information. In this study participants in the lecture groups reported that they benefited from their involvement in the different stages of the learning process. The participants reported that it was better when the researcher asked questions rather than telling them everything. The researcher also made similar observations. For instance when the researcher explained more often it seemed that participants began to losing interest. This seemed to suggest that when participants are not involved they tend to wonder and lose focus. In this case to avoid passive learning such adult learners need to be actively involved in the learning process. Participation has also been identified in literature as one of the principles of adult learning. According to Case (1993) adults learn by doing and as such active participation is especially important to adult learners in comparison to children.

In the second teaching session that was done with the second lecture group, participants were given some of the questions that BOM often answers which include how to make observations of fertility and how to preselect the gender of babies. The result of such an exercise was that participants seemed to have knowledge on how pre-selection was done and how fertility could be observed. It was observed that in any learning process involving adults, the learners will have some knowledge that they have accumulated before the learning process. The role of the researcher became that of finding out what they already know then clarify and explain. These findings are similar to that of (Cretchley & Castle, 2001) who argued that involving adults in the learning process through participation has positive learning outcomes. Participations also allows them to use the learned skills immediately so that they can see the relevance.

A closer analysis on participation suggests that it draws its principles from social learning theories. According to Vygotsky (1978) social interaction has a fundamental role in the development of cognition. In his social development theory he argued that the process of meaning making and other higher mental processes in the individual have their origin in social processes (Vygotsky, 1978). This suggests that cognitive development stems from social interactions where learners develop through guided learning from competent others to co-construct knowledge (Van der Riet 2009). This was evident in the group discussions within the lecture method, where participants were able to understand the core principles of the BOM. Through interacting with one another, the participants were able to validate their understanding and strengthening it through sharing.

In addition, in the experiments the teacher also demonstrated how charting of ovulation could be done. This was effective in that participants could follow the guidelines and were able to do it independently. This form of collaborative learning is similar to the teachings of Vygotsky (1978) who suggested that learning occurs through social interaction with a skillful tutor. He argued that the tutor models behaviors as well as provides verbal instructions for the learners. Wertsch (1985) notes that Vygotsky describes this as collaborative dialogue where learners seek to understand the actions or instructions provided by the tutor or teacher then they internalize the information and use it to guide or regulate their own performance. In conclusion, participants in the study reported that they benefited much from participation in the learning process. The lecture method allowed participation and dialogue among the participants. Participation allowed collaborative work between the researcher and the participants.

Participants in the homework group and lecture group had different views around the effectiveness of participation in learning BOM. Participants in the lecture group reported that they had benefited from the guidance from the researcher, the supervisor and the other competent participants. This is in line with Bandura and Vygotsky's social learning theory particularly how competent others can assist others to learn within their zone of proximal development (Wertsch, 1989; Bandura, 1972). For instance, a female participant in the lecture group argued that the researcher was able to give clarification to some aspects that were confusing such as how to identify the safe days to engage in sexual relations. She also

added that the supervisor was able to expand on that which made it even clearer. On the other hand, participants in the homework group noted that they benefited from self-discovery. As mentioned in chapter 4, 4 participants in the homework group reported that they enjoyed learning on their own as they were able to learn at their own time and using different resources such as the internet on top of the resources that they had been given by the researcher. Members of the homework group reported that they enjoyed discovering about the use of BOM on their own. They argued that they could do more readings on their own and had access to resources such as the internet and older people at home who were familiar with the method. In this case assigning homework should not be undermined as a method of teaching BOM as it has some advantages over direct teaching. Self-directed learning and self-discovery are further discussed in the proceeding sections.

#### ***5.2.2.2. Good Learning Environment.***

In this study it was observed that participants identified the learning environment as important. The lecture venue was a Masters students' seminar room that is situated at the psychology department. According to the participants venue was comfortable and they did not have any challenges with noise or other disturbances. This supports the view that the context in which learning takes place is of paramount importance (Spencer, 2006; Fenwick et al., 2006; Shaffer & Kipp, 2013). In addition, in the experiment the lecture rooms were informally structured and tables were arranged in a round table setting. Thus no members were sitting in front of others. In addition, the participants were encouraged to have fun such as sharing experiences about the related topics. The lectures were designed in a way to allow participants to direct the learning through group discussion and facilitated sharing. In this case there was a limited need for explanations by the researcher. Participants were divided into groups where they discussed questions around BOM. The participants reported that the informal setting of the lectures and the round table setting reduced their anxieties and fear of evaluation. It can thus be concluded that providing a good environment for learners when teaching BOM is very important (Billings, 1990). Teachers of BOM should make sure that the environment should be non-threatening, open and familiar to the audience.

#### **5.2.2.3. *Interest and motivation.***

Most of the participants in the homework and lecture groups showed interest in using the BOM after the experiment. The participants in all the groups were motivated by its advantages over existing methods and were keen to know more about the BOM. This result is similar to the findings of Fenwick et al. (2006) who argued that adult learners are motivated to learn when there is a need. This view is also in line with the teachings of the health belief model which suggests that people are willing to change their actions if they perceive benefits in doing so (Gagnon & Simon, 2005). According to the Health Belief Model people are willing to take health related action if they feel the negative health condition is avoidable. In this study it was stressed that unplanned pregnancies and failure to conceive were avoidable. This increased participants' interest to learn more about the method.

In addition to the above, the HBM model also suggests that people are likely to adopt pro-health behaviours if they think it is possible to take the recommended health action. In this experiment the participants were directed to cases and studies in which BOM was successfully utilised which was aimed at increasing their self-efficacy that they can use BOM successfully (Davies, 2012). The participants highlighted the need to learn about natural methods as there were side effects related to the use of other methods such as weight gain or problems when they would want to conceive. In this case, the participants were allowed to indicate what they wanted to learn. This form of relevance oriented learning was achieved by asking participants what they wanted to learn about BOM, and this was incorporated into the goals of the session. The perceived benefits of BOM over existing methods were identified as the possible reason for the motivation and interest expressed by the participants (Billings, 2002). Thus future interventions can also include an explanation of the advantages of BOM in their learning content particularly at the beginning of the program.

In tandem with the above discussion, most adults in the present study indicated that they were interested in having their second babies to be of a different sex than their first one. For some students, they were driven by a desire to have children since they had tried to do so with no luck. Similar to past findings, some participant were motivated to use BOM citing that they had faced challenges in using existing contraception and were keen in

learning a new method (Van der Rite, 2009). This also supports the view that needs increase the interest and motivation for adult learners. It has been argued that adults are driven to learn because they have needs such as improving their skills, getting promoted or learning new competencies (Cretchley & Castle, 2001). It can be argued that in the study, participants' interest and motivation to safeguard their relationships as well as their sexual and reproductive health were among the predictors of adult enrollment in the study of enhancing the use of BOM. In conclusion, participants in the different groups expressed different reasons for their interest and motivation to adopt BOM. Most saw it as a possible solution to the challenges they were facing when using other forms of contraception. Even those in the control group who were not initially taught about the workings of BOM also expressed optimism in using the method. Thus one may observe that identifying the needs of adults in South Africa might help them to encourage them to learn more about BOM.

#### ***5.2.2.4. Need for Further training.***

Although most of the participant expressed optimism in learning BOM after they were taught, most indicated that there was a need for further training before they could become independent users of the method. Some participants expressed concerns that the current knowledge they had was inadequate. The lecture method was delivered in an hour which was done because participants had other commitments. Because of the limited time of training, most of the participants were not comfortable in the independent use of the method at that time as they argued that they need more training in the method before they could begin to use it. Such findings echo Billings (2002) view that the teaching of BOM requires comprehensive learning that is guided by competent teachers. McSweeny (2014) also noted that BOM is a simple yet complex method which cannot be mastered in one lesson. One may thus observe that the participants in this experiment could have benefited more if they had more lessons and exposed to intensive training as well as arranging individual follow-ups to see how much they had learned and evaluate their progress. The need for further training is in line with (Fenwick et al., 2006) who argued that learning for adults is life-long and continued learning or training results in the improvement of skills that enhance individuals' personal development.

#### 5.2.2.5. *Guided learning.*

The results of this study have shown that learning can be enhanced by getting the help from capable others. Similarly the effective use of BOM has been largely attributed to the help from educators who are trained in the use of BOM (Billings, 1983). In this study a majority of participants in the lecture group reported that they benefitted from the guidance of the researcher and his supervisors. For example, a female participant in this group said that the researcher was able to give clarification to some aspects that were confusing such as how to identify the safe days to engage in sexual relations. Another participant also added that the supervisor was able to expand on that which made it even clearer. Through guided learning the researcher was able to conduct formative assessments to evaluate if the participants understood what they were learning. This form of formative assessment was used as a tool for improving the teaching-learning process for students (Simon & Gagnon, 2011). The researcher was thus able to modify teaching and learning activities to improve student attainment of the knowledge on BOM. This supports Billings (2002) conclusions that users of BOM need constant guidance before they can use the method independently. In the experiment, guidance was also provided by participants who were familiar with BOM who were able to share their knowledge and understanding of BOM before the teacher offered an explanation. Offering help to the learners by the researcher, supervisor and other students can be argued to be a form of scaffolding which is in line with the social learning perspective which is at the core of this study (Van de Riet, 2009). Scaffolding was essential in helping them understand about BOM by providing further explanations and clarifications to what they already knew.

One other technique that was used during the guided learning was brainstorming. Participants were asked questions around BOM such as how to make observations of fertility. This form of assessment of learning proved to be essential as it enabled the teacher to change approaches to the learning process (Simon & Gagnon, 2011). For instance, he used group assignment where participants were asked to answer some of the questions in the group. The participants, in this case, were able to answer the majority of the questions and the teacher's role was simplified to simple clarification. This view is similar to Regan (2003) findings which stated that in most cases encouraging peer discussions resulted in them coming up with 80 % of the information the teachers wanted to teach. With this in



mind, one may conclude that participation fosters self-discovery learning and simplifies the role of the educator. It can be concluded that encouraging participation and providing guidance at appropriate levels ensures the successful learning of BOM.

#### **5.2.2.6. *Self-Discovery.***

The results of the current study indicate that the participants in the homework group noted that they benefited from self-discovery. In the experiment, 4 participants in the homework group mentioned that they enjoyed learning on their own as they were able to learn at their own time and using different resources such as the internet on top of the resources that they had been given by the researcher. This concurs with existing literature which suggests that self-directed-learning is one of the most effective way of teaching adults (Regan, 2003). Self-directed-learning is said to be effective as it allows the learners to discover new information on their own (Merriam, Caffarella, & Baumgartner, 2012). Using homework was associated with improvements in participants understanding of BOM. This concurs with the work of (Kim, 2004) who notes that adult learners can also benefit from informal learning activities including self-paced study using books or video tapes, self-paced study using computers, attending or informal presentations, attending conferences or conventions, and reading professional journals or magazines. One may conclude that although self-directed learning was seen as limited than the lecture group, it is still effective in teaching BOM. Future studies may focus on how to make self-directed learning more effective as it will be very useful for adults who wish to learn more about BOM but do not have time to attend lectures and workshops (Doll, 2015). Electronic resources including websites have already been designed which help people on how to use BOM. For example the Billings Life official website, which offers answers to commonly asked questions, provides articles and power points as well as video tutorials. The site also provides contacts of professionals who are ready to help people.

#### **5.2.2.7. *Learning for problem-solving.***

Some of the participants in the study noted that they were interested in learning about BOM because for them it was a solution to the challenges they were already facing. Participants reported that they had experienced side effects after using contraceptive pills. Some also reported that it was not easy for them to buy condoms in local stores as it was embarrassing

for them to do so. Older participants also noted that they wanted to have desired sexes in their babies as they either had a male or female children only. Such findings are similar to those by Van der Riet (2009) and Phyfer (2012) who argue that there are current limitations in existing contraceptive methods. Thus adults are keen to learn about natural methods as they can be a solution to the existing methods. Knowles (1975) shared a similar view when he argued that adult learning focuses on problems that are realistic and in most cases adults start with a problem and then work to find a solution. In this study participants saw the learning of BOM as a possible solution to both challenges of using existing contraception as well as a good way of managing their fertility including sex selection of their children.

In line with the on-going discussion, the study results share similar conclusions to those made by MacGregor (2008) who notes that adult learners are goal oriented and as such they direct their learning towards fulfilling particular needs or demands such as to advance their studies, to progress up the career ladder, to follow business opportunities, to pass a driving test or to assist their children with homework. They usually require immediate value and relevance from their studies, and they often learn best when they are engaged in developing their learning objectives. Likewise, the participants in this study identified BOM as an elixir to many of the challenges they encountered and anticipated in marriages and thus were keen in learning about the Billings Ovulation Method. In conclusion, the study noted that some of the adult participants were motivated to learn because of the need to solve their existing problems. This view is also in line with one of the principles of adult learning is that in most cases it is problems based (Doll, 2015). In this study, it was observed that a number of participants were keen to learn about BOM because they had encountered some challenges in using existing methods such as condoms and contraceptive pills.

#### ***5.2.2.8. Prior knowledge of BOM and natural fertility management.***

Few participants in the study had prior knowledge of the use of BOM. Only 13 out of 60 were familiar with the BOM. This is contrary to existing literature which highlight that prior knowledge is a common denominator by many researchers in adult learning (Johnson et al., 2015). The results of this study are on the other hand similar to the findings by

(Nondabula, 2013) who noted that at the University of KwaZulu-Natal, most people were not familiar with BOM. Although participants had no prior knowledge of BOM in particular they had experience and knowledge of other natural fertility management methods such as the Calendar method. Thus some are of the opinion that BOM is the same as the calendar method. It was then easier to explain their differences and in the process improving their understanding of BOM. Despite their limited understanding of BOM their knowledge of other natural methods enabled them to appreciate the benefits of using BOM as it was another natural method of family planning (Grimes et al., 2004). In conclusion, if successfully guided by an educator, participants' former experiences and prior knowledge can assist the adult to connect the current learning experience to something learned or encountered in the past. This may also facilitate in making the learning experience more meaningful.

Although the majority of the participants reported that they were not familiar with the BOM, 3 older participants reported that they were familiar with its teachings although they did not know the concept BOM. They reported that they knew that wetness of the vagina was a sign of fertility and that there were days when they were not fertile. Some of the participants reported having used the calendar method and had seen the benefits of natural forms of family planning. Similarly, past experience is identified as important to adults in their learning even if the terminology or concepts are different (Fenwick et al., 2006). From a social learning perspective the participants prior knowledge on natural family planning was used in scaffolding within their "Zone of Proximal Development" in understanding BOM (Wertsch, 1989). The "zone of proximal development" refers to the difference between a learner's ability to perform a task independently versus with guidance (Vygotsky, 1978). The facilitator explained some differences between these methods and highlighted that although these methods were different, they shared some similarities. Their existing knowledge was thus used to further explain BOM especially by unpacking the differences between the methods.

In this study, it was noted that some of participants had past experiences with using various forms of family planning including BOM. Two female participants were familiar with BOM and were able to explain it to their peers. Their experiences in using other forms of family planning were also used to explain the advantages of BOM. This echoes the

understanding that adult learners often have rich knowledge that they have accumulated through experience in their lifetime which they bring life experiences and knowledge to the learning process (Regan, 2003). Most participants were then keen to learn about BOM because they had experienced challenges when using other forms of contraception. Such challenges were also used as motivations for them adopt the use of natural methods. The prior knowledge of BOM and other natural methods were used as reference in facilitated sharing which is linked to principles of adult learning which are participation and experience (Merriam et al., 2012). The results of this study are similar to those identified by Dirkx (2006) who argues that the effect of prior knowledge on subsequent learning tasks can be observed in many adult learning tasks. Dirkx (2006) argued that students who have mastered the principles of algebra find it easier to grasp advanced work in mathematics such as calculus. In the current study it was noted that participants who had prior knowledge of BOM and other natural methods found it easier to learn about BOM. As such acknowledging participants prior knowledge can be identified as an important factor that enhances peoples learning of BOM.

In conclusion, the following factors and processes were identified to be affecting the learning of BOM in the South African context. These include interest and motivation, and participation. The first observation made is that there are currently a number of ways that can be used to teach adults, however, some are more effective than others. According to Van der Riet (2009) most successful teaching programs involving adults have involved participatory approaches where members actively engage and share their experiences. In this study, the lecture group was exposed to a method that encouraged the participation of the group members. This encouraged collaborative partnership between the participants. Acknowledging that adult learners have knowledge and experience was essential as it was a foundation to develop their knowledge (Blessing, Blessing, & Fleck, 2012). Participants were encouraged to share their experiences with contraception and the challenges they have encountered. Similar to previous studies, this study also identified the importance of making a good environment ideal for adult learning (Regan, 2003). The lectures and assessments were done in a lecture room which was seen and described as familiar to the university students and was also chosen because of availability. In contrary to existing literature which suggests that adult learning should take place informal settings (Cretchley & Castle, 2001).

This could have been an advantage in that university students are accustomed to learning in a similar environment and as such a setting was not alien to them.

### **5.2.3. Research question 3:**

#### **What are some of the barriers to take into account in the effective teaching BOM?**

In the present study there were a number of barriers to learning and adoption of BOM. These barriers are presented in Table 15 in the results chapter and are further discussed below to explore how the present findings on them are supported or not, by previous researchers, starting with the theme of Time Constraints. Similarly, studies that have been done on adult learning and general learning have identified many barriers that affect learning (Merriam et al., 2012).

##### **5.2.3.1. Time constraints.**

Time challenges were identified as a barrier in this study. The results showed that adult learners are often very busy and rarely have time to spare. Adult learners may thus not be able to attend lecture or teaching sessions for longer durations (Aitichison, 2003) and this creates challenges for their learning. Most Participants had busy schedules such as taking care of their families, work. This supports Aitichison's (2003) view that adult learning may not always happen easily as in conventional education because of time (Aitchison, 2003). Similar to other studies the participants in the study were selected from postgraduate students who are often busy submitting research proposals and some submitting assignments. Some of the participants who had volunteered to be part of the study did not manage to participate. They reported that they had other commitments they needed to attend to such as school work or attending to meetings. The results thus support the hypothesis that time constraints are one of the common barriers in adult learning (Case, 1994; Merriam et al., 2012; Aitchison, 2003).

Time constrains are among other challenges that can also be better explained by the Ecological Systems perspective. From the ecological systems perspective, this can be seen that time challenges may be due to individual factors or due to commitments to the family or school relationships and thus they stem from both the micro and macro system as noted

in the chapter (Van der Riet, 2009; Shaffer & Kipp, 2013). A number of participants did not turn up for the evaluation process to write the test. Over 40 participants were available for the lecture. However, only 20 managed to write the test. They mentioned that they had other commitments including attending classes, writing assignments and going to their part-time jobs. Time constraints thus contributed to the low turnout most of the participants who were in the lecture group did not come for the assessment. Most reported that they had other commitments on the day of testing despite the fact that they had shown interest to participate in the study.

In line with the above discussion, participants in the study were concerned that BOM takes the time to master. Participants mentioned that their current knowledge of BOM after being part of one class was not adequate for them to adopt the method and would require further training. This result is in line with the findings that have been found in other countries. According to Billings (2002) the teaching of BOM cannot be done in one teaching session. The couple who wish to use BOM require constant tutoring until they are competent to use BOM independently. This can be considered as a disadvantage as the use of other methods of fertility management such as pills and condoms do not require extensive learning and simple instructions comes with the methods. In most cases they need to learn and try out the instructions when they get home and the next time they meet with the teacher then they could be helped in those areas they were struggling with.

#### **5.2.3.2. *Nature of modern relationships.***

The results of the study identified the existence of multiple partners as one of the challenges to the adoption of BOM. In the current study participants also reported that many people have multiple partners and such infidelity make it difficult to use BOM as a method of family planning as it makes them vulnerable to diseases. Van der Riet (2009) also noted that today's youth culture is characterized by the normalization of multiple partners. The majority of the participants preferred the use of BOM within a marriage context. In other parts of the world, BOM has been used by individuals who are not married but are in committed relationships (Billings, 2002). Billings (2002) argues that it is highly recommended that BOM be used by people who are committed to each other and those who are able to commit to the method. Similarly, the existence of multiple partners has

been identified in literature as a challenge in many efforts to promote safe sexual practices (Barnett & Rivers, 2009). Multiple partners have also been identified as a challenge to the use of BOM as it often results in the violation of the rules and procedures of the method (Billings, 2002). The current norms around sexuality can be identified as a barrier that is identified in the meso-system of the ecological systems model (Shaffer & Kipp, 2013).

In line with the above discussion, the realities of multiple partners is one of the common identified concerns in adopting contraception has been raised in other studies before (Van der Riet, 2009). A study by in KwaZulu-Natal discovered that although the availability of contraceptive pills improved there was no increase in the number of sexual partners (Hoque, 2011). However, the number of partners they already had did not change. In this case the reality of multiple partners has been a challenge in adopting other forms of family planning. In addition, a study by (Hoque, 2011) indicated that most of undergraduate university students in KwaZulu-Natal are sexually active. 41.5 % of the participants in Hoque's (2011) study reported that at some point they had multiple sexual partners and half of them reported that they sometimes or rarely used contraceptives during sex. In their study the participants who had multiple sexual partners had a median of 2 (range, 2–4) sexual partners. In conclusion, this study concurs with existing literature which sees the reality of multiple partners as a form of risky sexual practice that exists and that should be considered before advocating for the use of contraception which does not guarantee protected from sexually transmitted diseases.

#### ***5.2.3.3. Technicality of the Billings Ovulation***

##### ***Method.***

One of the concerns in the study was that BOM seems to be technical in that it requires charting and constant consultations with the tutor and takes longer time to master. Participants were aware that their current knowledge of BOM after being taught was still not adequate for them to adopt the method and would require further training. These results show that it is impossible to fully comprehend BOM in just one session. One may observe that there are many possible barriers to adopting BOM and one of them is failure to understand the method and following the instructions (Smith & Smith, 2014). BOM tends to be scientific as it requires observations of one's body. Similar findings have been noted

by Billings (1983) who pointed out that the teaching of BOM cannot be done in one teaching session. Billings (2002) added that when learning BOM couples would require constant tutoring as they need to learn and try out the instructions when they get home and the next time they meet with the teacher then they could be helped in those areas they were struggling with. Such fears have been noted by McSweeney (2011), who argued that many people have expressed concerns with regards to their ability to use the BOM independently. McSweeney (2011) thus recommended that couples should have regular consults with their educators until a point where they become independent users. It can be concluded that the nature of this study did not equip the participants with enough knowledge for them to independently use BOM but rather to identify it as a good option that they could learn more about.

#### **5.2.3.4. *Language of instructions.***

The study results indicated that language was one of the barriers that were identified by the participants. In this study participants also noted the language that was used as a possible challenge to their understanding. Although only 2 participants identified the language as a challenge, it was a concern that was essential as it may be an issue when teaching BOM to communities where the English language is not often used or among illiterate communities. The 2 participants noted that they might have benefited more the lecture had been done in IsiZulu. This supports existing literature on learning which identify language as one common barrier to learning (Dirkx, 2006; Aitichison, 2003). Similarly (Kim, 2004) emphasized the importance of language in adult learning. Kim (2004) noted that adults often benefit from the use of simple language. Dirkx (2006) also shared similar views when he argued that the use of big words and jargon is likely to confuse the adult learner. In this case, the use of simple language in the instruction will result in better learning outcomes. Based on the results of the study, it can be concluded that when teaching BOM, it is important to use a language that the audience are familiar with. In addition, it is important to ensure that the language is simple and easy to comprehend. The challenge of language as a barrier in learning is a common theme that has been identified in numerous studies (Byram & Fleming, 1998).



In order to avoid language barriers, when teaching adults one has to consider the cultural context (Karim & Karim, 2010). The researcher was not fluent in the local languages of KwaZulu-Natal and as such had to use a universal language which was the language of instruction at the university. The findings of this study are in line with the findings of Byram and Fleming (1998) who concluded that teachers of adult learners need to develop sensitivity to cultural difference and its impact on communication, and to acquire the skills of discovering and interpreting other cultures, other values, beliefs and behaviors which lie beneath the surface of cross-cultural communication. In conclusion, although language was not a major barrier in this study it is one of the important factor that needs to be taken into account especially when BOM is to be introduced to non-literate communities which are not like university students that were used in the present study.

#### **5.2.3.5. *Resistance and task avoidance.***

In the study, there were a number of instances of resistance. Adults are internally motivated and self-directed and as such pushing ideas and options to them may result in resistance (Dirkx, 2006). As mentioned in the discussion section, some of the participants appeared to be reluctant to engage, and they seemed distracted. A number of such participants did not come for the evaluation session where they had to write the test which was to be used to evaluate their performance. Literature indicates that one of the common reasons for task avoidance is fear of evaluation (Regan, 2003; Case, 1994). Fear of evaluation could thus be a possible reason why participants who had initially attended the teaching sessions did not come for the evaluation session. This study has also confirmed that resistance and task avoidance are very common in learning which often results in poor response to instruction (Regan, 2003; Dirkx, 2006).

Another explanation for the resistance was the disjunction between learning and teaching styles. Participants were drawn from different faculties and as such, they are accustomed to certain different styles. According to Regan (2003) across disciplines, content is configured differently and sometimes students resist when their preferred approach to learning is at odds with how the information is being presented or organized. Despite this, avoidance posed as a big challenge for the researcher as it impacted on the learning process participate but not come to the experiment. It was observed that in dealing with the

resistance, the teacher needed to deal more constructively with resistance to learning by accepting that it is normal and that students have the right to resist and that students cannot be forced to learn (Regan, 2003). It can thus be concluded that, teachers of BOM can create conditions that are conducive to learning and minimise resistance. Another cause for resistance identified was the technicality of the method, the problem of language and scepticism around the effectiveness of the method.

One of the possible reason for resistance was skepticism of the effectiveness of the method. According to Regan (2003) they will only learn when they are internally motivated to do so and if they are unsure of the benefits of the learning process they are likely to resist. In this study some of the participants were skeptical of the effectiveness of the method especially its ability to postpone pregnancy. Male participants argued that a girl might not properly take notice of the signs and get pregnant in the process. As a new method, such skepticism is expected, and future projects could also aim at increasing user confidence in using BOM (Smith & Smith, 2014). In conclusion, resistance and task avoidance were seen as common barriers to both the adoption of BOM as well as engaging in learning. The reasons for the resistance were not clear but it can be hypothesized that it could have resulted from fear of evaluation, technicality of the method or their scepticism about the effectiveness of BOM. As such programs to promote the use of BOM should also focus on informing people about the benefits of using BOM and the scientific studies that have been done to prove its effectiveness.

### **5.3. Summary of the Study**

This study investigated two teaching methods of enhancing the knowledge and use of the Billings' Ovulation Method (BOM) to post-graduate students at the University of KwaZulu-Natal. The research questions investigated were: 1. Which of the following two methods (the Lecture Approach or the Assignment Method) will give more significant results as a way of teaching the use of BOM to adult learners? 2. What factors (principles and processes) are required for effective adult learning of BOM? 3. What are some of the barriers to take into account in the effective teaching BOM?

In the experiment, a sample of 60 male and female postgraduate students was used in used a quasi-experimental post-test only control group design. Two experimental groups were evaluated based

on a test that was written after exposure to either direct teaching or self-directed learning. In the study, the participants were exposed to two different teaching methods (lecture method and homework method). These teaching methods were further investigated to identify which teaching method would result in higher performance and could thus be adopted as a means of enhancing the use of BOM in South Africa. The Statistical Package for Social Sciences (SPSS) was used to analyze the test scores from the achievement test. One-way ANOVA was used to compare the performances of the control group, the lecture group, and the homework group. For further validation of findings, the Friedman tests and the Wilcoxon Ranks tests were also used to analyze the data.

The results showed that when teaching BOM, using a lecture method produces a higher performance as compared to assigning homework. In the analysis, it was identified that the lecture group that involved directly teaching performed well than those assigned to self-directed learning. The findings of this study share similar outcomes to the work of (Smith & Smith, 2014) who saw direct teaching as essential to learning of BOM. Smith et al. (2014) argue that teaching methods such as tutorials, lectures and workshops were more effective in teaching BOM as compared to self-studies. Although self-studies have lower performance rates, their effectiveness should not be undermined as it also resulted in improvements of the participants' awareness of BOM as compared to participants who were not exposed to any teaching method. These results concur with the findings of (Billings, 2002) who also observed that for people to adopt the use of BOM, they require active teaching on an ongoing basis until they are competent to continue independently.

Furthermore, the result of the current study reveals that assigning homework can be useful for those people who are not able to attend classes due to their commitments to other things. The participants who engaged in self-directed learning also managed to learn much about BOM. The members of the homework group expressed similar optimism to learn more about just as those in the lecture group. This suggests that both methods are effective in enhancing the knowledge and use of BOM. Despite this, this study has proved that although many teaching methods exist for teaching BOM. Some are way better than others and they have better learning outcomes. In the context of South Africa there remains a need to identify ways to enhance the knowledge and use of the Billings' Ovulation Method with future interventions having to be more intensive.

In addition to the above, the participants in the experimental groups had improved understanding of the Billings Ovulation Method as compared to those who were not taught (in the control group). Both the homework group and the lecture group were able to explain the basic teachings of BOM and could articulate the basic steps of understanding fertility. In comparison, the lecture group members had a better understanding of the method than any other group. On the other hand, the members of the control group showed very limited knowledge and understanding of BOM which is similar to the findings of scholars such as (Nondabula, 2013) who discovered that university students had very limited knowledge of BOM.

It was also concluded that there are a number of barriers to the learning and adoption of BOM. Similar to past studies on adult learning, this study identified the following barriers to learning of BOM; time constraints, fear of evaluation, language and the technicality of the method (Case, 1994; Regan, 2003, Fenwick et al., 2006). The barriers to the adoption of BOM were; realities of multiple sexual partners, scepticism about the effectiveness of BOM and technicality of the method (McSweeney, 2011; Smith & Smith, 2014). These barriers have also been identified in teaching BOM elsewhere around the world and have been a challenge of adopting other forms of contraception including pills and injections (Billings, 2002; McSweeney 2011; Smith & Smith, 2014).

There were a number of factors that were identified which are to be considered when introducing BOM. These factors include participation, facilitated sharing, the importance of prior knowledge and learning for the need of a problem solving. These share common grounds with the principles of adult learning as well as social learning by Lev Vygotsky (Van der Riet, 2009). The factors have noted to be related with a better understanding of the key issues in BOM and as such they need to be considered when conducting other programs that seek to enhance the use of BOM.

#### **5.4. Conclusions/Implications of the study**

Based on the findings of the study set above, the following conclusions and implications clearly stand out;

First, although there are many methods that can be adopted when teaching BOM to adults in South Africa, methods that encourage participation and collaboration with peers and competent other have better outcomes as compared to those performed individually such as in self-directed learning

(Billings, 2002; Smith & Smith, 2014). Methods that employ direct teachings such as using a lecture method or workshops allow participation which encourages networking with peers and colleagues. Such a conclusion is in line with the views of the Billings family who are the founders of the method who argue that teaching BOM through the guidance of a competent teacher or tutor increase the effectiveness of the method and helps users to be able to use it independently (Billings, 2002). Van der Riet (2009) also shares similar views when she postulates that participatory approaches and guided learning are effective in ensuring successful educational outcomes. The study concluded that individuals who are exposed to the methods that promote direct teaching result in improved understanding of the workings of BOM.

Secondly, the study was able to meet one of its core objectives which were to enhance the postgraduate students' knowledge and use of BOM. More than 60 postgraduate students were part of the study and these were exposed to two different teaching methods around the workings of the BOM. These participants were able to acquire knowledge and retain the information that they were taught in the teaching sessions. Although the participants were exposed to the teaching of BOM, the participants were not fully confident in using the method. This was because they felt that they still needed more training or teaching about BOM. Despite these reservations, their optimism in learning BOM was high and such optimism can be seen as a good starting point of introducing the method in South Africa. It was expected that participants would not know how to fully use the method after a single teaching session and as such the experiment only aimed to introduce the participants to the workings of BOM so that they would be more curious and would consider using it.

The third important conclusion was that there are a number of factors (principles and processes) are required for effective adult learning of BOM in the South African context. Although some of these factors and principles are embedded in the theories of adult learning, they are important to highlight in the context of the teaching of the Billings Ovulation Method. These factors include the importance of participation and prior knowledge. In addition, it was identified that similar to adult learning the teaching of BOM can be aimed at problem-solving the existing challenges that couples face. It was also concluded that adults also benefit from interaction and sharing of the experiences with colleagues and peers when learning about BOM. These factors are consistent with the previous studies results on the teaching of BOM as well as general adult education (Billings, 1983; Billings, 2002; Smith & Smith, 2014; Case, 1993; Weiten, 2010).

Given the above, it is argued that direct teaching which involves actively teaching was the most effective way of teaching BOM. This is because most of the people that were directly taught in the lecture method showed better understanding of the method and could demonstrate their understanding. On the other, hand self-directed learning can also be a good alternative as it was observed that those who took part in self-directed learning had improved knowledge and understanding of BOM as compared to those that were not taught. The participants from the Homework and lecture group reported that there was need for further ongoing training on BOM to increase their understanding and ability to use the method. In conclusion, although the lecture method is preferable all teaching methods were noted to have contributed to the enhancement of the knowledge and use of BOM.

Findings of a study on BOM at the University of KwaZulu-Natal which concluded that most students are unaware of the workings of BOM were also noticed. The results from control group confirmed that university under study had little knowledge of the workings of the Billings Ovulation Method. The participants had very low marks as compared to the other groups and they failed to articulate the content of BOM (its nature and background). The majority of the participants in this group maintained that they had never heard of BOM and were not familiar with how it works. Despite their limited knowledge on the method, the participants who were not taught about BOM expressed optimism in learning the method. This further strengthens the view that there remains a great need to teach and enhance the knowledge and use of BOM in South Africa.

## **5.5. Recommendations for Policy and Practice**

Based on the implications of the findings highlighted above, the following recommendations for policy and practice are made:

1. The study has identified a strong need for the adoption and use of the BOM in South Africa.
2. Stakeholders in the health sector and government can contribute to the enhancement of the knowledge and use of BOM. The department of health and maternity clinics can take on the initiative of encouraging the use of BOM.
3. Providing many fertility management options to adults in Africa would largely improve contraception and reduction of sexually transmitted diseases in South Africa.

## **5.6. Limitations of the Study**

There were some gaps that were noted in this study which are related to the research methodology used as well as to the teaching and learning process. In this study, the sample size was small as only 60 participants were able to write the test. Very few participants turned up to write the achievement test after they were taught about the method. This creates a challenge to the generalizability of the findings (Blanche et al., 2006). It has been argued that it may not be logical to generalize findings based on small samples as they will not be a representation of the entire population (Creswell & Garrett, 2008). However, the findings could be transferable to other settings and participants as the study can be argued to be indicative of routine practices. In conclusion, the study could have benefited from a bigger sample which could aid on the generalization of the findings.

In addition, in the current research, no regression analysis was done to control other factors such as age and gender. Gender and age can be argued to be factors that influence the adoption of BOM (Smith & Smith, 2014). As such future studies may focus on the performance between the genders to see if they can learn about BOM differently.

A quantitative measure was not utilized in understanding the participants' interest and motivation to use BOM after being exposed to the different teaching methods. For instance, the study could have used a likert scale to further validate the levels of willingness to adopt BOM as a method of contraception.

## **5.7. Recommendations for further Research**

Based on the limitations of the present study just highlighted, the following suggestions for future studies are made.

First, there is a need for another study on teaching the BOM to adults that should consider adopting participatory approaches in which the participants should be made to get involved in all stages of the process. This includes the setting of goals for the teachings and enabling them to share experiences. In addition, further studies are needed that should ensure that the teaching methods are intensive and should use many techniques and resources. They could utilize other techniques to spread the information about natural fertility management methods. For instance, using various mediums such as the internet or community radio helps to promote healthy sexual practices (Agha,

2002). In this case, the use of a social marketing program could have a higher influence in changing people's attitudes and beliefs. According to Agha (2002), a combination of interventions for contraception use and social marketing programs improve preventative sexual health behavior.

Second, to achieve better outcomes future interventions that seek to enhance the use of BOM should also provide an intervention targeting the reduction of multiple partners. This is because the reality of multiple partners was one of the main concerns that were identified as a barrier to the adoption and use of BOM. It can also be suggested that future studies that should seek to understand people's attitudes towards a topic such as interest and motivation to adopt the use of BOM and make use of rating scales such as the Likert scale. A Likert scale is used to represent people's attitudes to a topic and scale is one of the most widely used approaches to scaling responses in survey research.



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## APPENDICES

### Appendix: 1. Letter to the University Registrar



07 March 2014

To: The University of KwaZulu-Natal Registrar

Prof J Meyerowitz.

My name is Ruhukwa Cardwick and I am a postgraduate student from the Discipline of Psychology in the School of Applied Human Sciences. I am conducting a study on the knowledge and utility of the Billings Ovulation Method (BOM) among UKZN students. I would like to request permission to recruit students during lectures and conduct the research at UKZN Pietermaritzburg campus. Students will be recruited through the use of posters which will be posted in students' recreational areas and other prominent places on campus. If permission is granted, the announcements will be arranged in consultation with the lecturers. The announcements will be brief and should not be disruptive to those attending the lectures. Students will be given a short description of the study and what participation will entail and will be asked if they would like to participate in the study at a later date.

If you would like to discuss any further details of my project or have any questions about this request please contact Ruhukwa Cardwick on (0745059933) email address [210549964@stu.ukzn.ac.za](mailto:210549964@stu.ukzn.ac.za) or my supervisors, N Buthelezi , email [buthelazin@ukzn.ac.za](mailto:buthelazin@ukzn.ac.za) or Professor A Nwoye on cell 0762572990 or email [nwoye@ukzn.ac.za](mailto:nwoye@ukzn.ac.za).

Yours sincerely,

Cardwick Ruhukwa

Master's Clinical Psychology Student, UKZN

Signed .....

Supervisor: N Buthelezi  
Signature.....

Co-Supervisor: Prof. A. Nwoye  
Signature:.....

## Appendix 2. Advert for the study



Lets talk about natural family Planning!!!!!!!!!!!!!!

Interested in exploring natural contraception????? I am conducting a study on natural fertility management focussing on the billing ovulation method (BOM). If you are interested to know more about the billing ovulation method join in the study.

For more information contact me Cardwick Ruhukwa (Psychology Masters student)at cell 0628133277 or email [cardwick58@gmail.com](mailto:cardwick58@gmail.com)

### Appendix 3: Information Sheet for Group



Dear Sir/Madam,

Thank you for agreeing to participate in this experiment. This sheet is intended to provide you with information about this study and your role in it. To agree to participate in this study, you must be above 18 years of age.

My name is Cardwick Ruhukwa. I am a post-graduate student at UKZN (Pietermaritzburg). As part of my degree, I am conducting research on the knowledge and use of the Billings Ovulation Method of natural fertility management. By researching this topic, I hope to gain a better understanding of the skills and knowledge of how to use the Billings Method and how training in the Method can help students to engage in safer sex and to help them get the desired gender of their baby if they intend to conceive.

#### The experiment

Participants will be divided into three equal groups, two treatment groups and one control group. These groups will be exposed to the knowledge of the Billings Ovulation Method differently depending on the group that they are placed. Those in the experimental groups are going to be taught about the nature and use of the Billings Method. Those in the control group are not going to be taught about the nature and use of the Billings Method during the research. However, each group will be subjected to equal test of the extent of their knowledge of Billings Method. Those in the experimental groups will be taught about the Method before the tests of what they have gained from their learning will be given to them. The teaching of the Billings Method will take about one hour to 2 hours. After the teaching workshops participants will be asked to write a test. However, the tests will not be associated with your individual names and as such there is no obligation to get all answers right. This research is investigating your knowledge and retention skills after being exposed or not exposed to information about the workings of the Billings Method. You also have no obligation to answer any questions you don't want to. There will be a follow up test.

Your participation in this focus group is voluntary and you will not be forced to participate. You are also free to leave the study at any time if you wish.

### Confidentiality

Your identity will be kept confidential in this process. This will be ensured by not using your names in the teaching process and in the tests. In this case all the names of the participants will remain anonymous.

Because you are in a group setting, you will be asked to sign a confidentiality pledge stating that everything said in the groups will be kept confidential. By promising to be confidential you are agreeing not to reveal the identity of anyone in the group or what was said by them to anyone outside the group.

However, please be advised that we cannot guarantee confidentiality even if a pledge is signed. For this reason, you will not be asked to discuss any personal issues, but will instead be asked general questions about what other students do and think. It is also recommended that you do not disclose any sensitive information about yourself when taking part in this study.

### What happens after this experiment?

There is going to be a discussion of various topics. After the discussion, we will take the recordings and transcribe the information into a written form. No names will be disclosed in the process. The transcriptions will then be analysed and a report will be written. This report will be used for a Master's project. The data for the study will be available to the researchers working on the project and my supervisors. The findings of the study might also be reported at a Conference, and they might be used to write a journal article. In all of these, your identity will be kept confidential by using your pseudonym.

### Storage of project data

The transcriptions of the discussions will be kept for future research purposes. They will be stored for five years in a locked cabinet in my supervisors' offices, as will any other materials relating to this research. To keep your identity confidential, all data will be stored separately from information which links it to your actual name.

### Benefits and risks of study

The study will increase participants understanding about natural fertility management especially the use of Billings Method. It will also increase their awareness of how to avoid unplanned pregnancy and how to use the method to get desired gender of their child and increase the likelihood of falling pregnant, when one really wants to. Thus the study will also add knowledge to the existing body of knowledge on safe sex practices.

If you have any questions you would like to ask us, you are welcome to contact me on 0749653964 or email [210549964@stu.ukzn.ac.za](mailto:210549964@stu.ukzn.ac.za). Alternatively you may also contact my supervisors Professor Nwoye on cell 0762572990 or Ms N Buthelezi on 033 2605670 or email [buthlezin@ukzn.ac.za](mailto:buthlezin@ukzn.ac.za).



For any ethical issues contact Phume Xumba on the Humanities and Social Science Research Ethics Committee via phone (031) 260 3587 or email [ximbap@ukzn.ac.za](mailto:ximbap@ukzn.ac.za).

Thank you for your time and participation. It is most appreciated. I hope this is an interesting and rewarding experience for you.

Yours sincerely,

Cardwick Ruhukwa

Master's Clinical Psychology Student, UKZN

## Appendix 4: Consent form



I \_\_\_\_\_ hereby agree to participate in this study focusing on the knowledge and utilisation of the Billings Ovulation Method. I confirm that I have had an opportunity to read and understand the information sheet given to me.

I hereby consent/ do not consent to have this interview and focus group discussion audio-recorded.

I also declare that the purpose of the study has been explained to me. I understand what is expected of me in terms of my participation in this study and the time commitment I am making to participate in this study.

I understand that my participation is voluntary and I know that I may withdraw from the study at any point, without negative consequences. I understand that the interview and focus group discussion will be audio recorded. I understand that there will be limitation to confidentiality in the focus group. Therefore I understand the conditions of the confidentiality pledge.

I understand that my data will be stored securely for five years and used for future research. I understand that measures will be taken to ensure that my identity is protected and my participation in this research will be confidential. I understand that no identifying information about me will be published.

I have the contact details of the researcher should I have any more questions about the research.

\_\_\_\_\_  
Signature of Participant

\_\_\_\_\_  
Date

Consent to/ not to be recorded.

## Appendix 5: Group Confidentiality Pledge



I \_\_\_\_\_ have agreed to participate in this study focusing on the use of the Billings Ovulation Method of natural fertility regulation. As part of my commitment to participate in this study I hereby agree to keep everything that happens in this experiment confidential. This means that I agree not to expose the identities of other participants.

I understand that every member of this group has the right to respect and privacy. I further understand that while the researcher has no control over my actions, if I break my promise of confidentiality that this may have damaging effects on my fellow participants and research in this field.

I understand that it is important for this research that I, as well as my fellow participants, feel comfortable to express ourselves without fear of any negative consequences. I hereby agree to keep this confidential because I am aware that if I do not, my fellow participants may be harmed in some way by my actions.

\_\_\_\_\_  
Signature of participant

\_\_\_\_\_  
Date

## Appendix 6: Achievement test



*SCHOOL OF APPLIED HUMAN SCIENCES*

*Billings Ovulation Method natural fertility management*

Duration: 1 hour 30 minutes

Total marks: 25

Pages: 1

### INSTRUCTIONS TO PARTICIPANTS

Write an essay of about 4-5 pages. Answer every aspect of the question.

Examples can be used in areas that need explanation.

Do not put your names or student number on answer sheets.

Answers must be written in ink only (do not use pencil).

Try to write as clear as possible.

Use of other materials is not allowed (notes, cell phone, textbooks).

### QUESTION

**Write a one paged essay showing your understanding of the following aspects of the Billing ovulation method:**

What is the BOM? (2)

How does one make observations of fertility (wetness and dryness) and how to identify and mark the key day/ ovulation (charting)? (5)

How can one achieve or avoid/postpone pregnancy using BOM?(5)

What are the advantages and disadvantages of using BOM as a way of natural fertility management? (4)

What are some of the special cases to look out for when using BOM? (2)

Now that you have been exposed to BOM, or aware of BOM, to what how confident are you in using the method. If male, are you willing to cooperate with the method? (2)

What aspect of the learning process did you find helpful in your learning and understanding of BOM and what were some of the challenges or barriers you faced that limited your understanding of BOM? (5)

## Appendix 7: Test Marking Scheme

### Marking scheme

What is natural fertility management/family planning? What is the BOM? (2)

Answers – *natural fertility management method/method of contraception. the method was discovered by the Billings in Australia.*

How can one make observations of fertility (wetness and dryness) and how to identify and mark the key day/ ovulation (charting). (5)

Answers – *observation of cervical mucus on the vulva of the vagina. Observations done at night, Use of hands, Observe the presence of the mucus as well as its elasticity, colour and texture (slipperiness)*

How does one achieve or avoid/postpone pregnancy using BOM. (5)

Answers – *avoiding or achieving pregnancy depends on following instructions and observing the rules. To achieve pregnancy coitus can be timed during the wet days. However, this depends on whether there is a preferred sex selection. In cases of a male child sex should be timed 2 days before ovulation. To avoid pregnancy abstinence during the wet days is important.*

What are the advantages and disadvantages of using BOM as a way of natural fertility management? (4)

Answers – *advantages – natural, No side effects, multipurpose, highly effective, and cheap*

*Disadvantages – requires time, does not protect people from STI's*

What Special cases need to be considered when using BOM? (When should you not use BOM?) ( 2)

Answers – *after having an abortion, when reaching menopause, when breast feeding' Discontinue pill or IUD, effects of Stress, Constant wetness*

If woman,, how confident are you in using BOM? If man, to what extend are you willing to cooperate with the method? (2)

Answers – *no direct answer but answer should indicate level of confidence and the possibility of them adopting BOM.*

What aspect of the learning process did you find helpful in your learning and understanding of BOM and

Answer: *any list of items found helpful by participants or a list of barriers they observed.*

## Appendix 8: Raw scores of the students marks on the achievement test

The following table shows the different test scores of each participant in the different groups. The scores were marked out of 25 and were used to compare the performance of the different groups.

### Participant Test Marks per group marked out of 25

Participant	Control group	Homework group	Lecture group
	Raw score	Raw score	Raw score
1	11	19	23
2	7	10	22
3	12	15	13
4	2	7	20
5	13	11	20
6	9	16	16
7	5	20	25
8	8	11	25
9	11	13	23
10	7	10	19
11	12	19	17
12	3	15	20
13	5	17	23
14	10	18	18
15	6	10	22
16	8	14	16
17	12	13	25
18	7	8	21
19	17	18	17
20	9	19	20